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EP 유럽특허 : 오스트리아 벨기에 스위스 리히텐슈타인 사이프러스 독일 덴마크 스페인 핀란드 프랑스 영국 그리스 아일랜드 이탈리아 룩셈부르크 모나코 네덜란드 포르투칼 스웨덴

OA OAPI특허 : 부르키나파소 베냉 중앙아프리카 콩고 코트디브와르 카메룬 가봉 기네 말리 모리타니 니제르 세네갈 차드 토고

국내특허 : 알바니아 오스트레일리아 바베이도스 불가리아 브라질 캐나다 중국 체크 에스토니아 헝가리 이스라엘 아이슬란드 일본 대한민국 스리랑카 라이베리아 리투아니아 라트비아 마다가스카르 마케도니아 몽고 멕시코 노르웨이 뉴질랜드 솔로베니아 슬로바키아 터키 트리니다드토바고 우크라이나 미국 우즈베키스탄 베트남 폴란드 루마니아 싱가포르 그루지야

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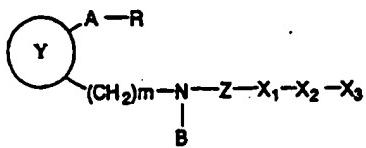
(74) 대리인 김창세

심사첨구 : 없음

(54) 비사이클릭 아미노 유도체 및 이들을 함유하는 프로스타글란딘 디2 길항제

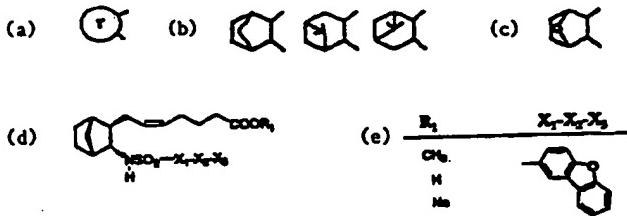
요약

하기 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물(예를 들면, (e)의 조건을 갖는 (d) 화합물)은 프로스타글란딘 D<sub>2</sub> (PGD<sub>2</sub>)의 길항제로서 유용하고, 비만 세포의 기능 부전을 포함하는 질병(예: 전신성 비만 세포증, 저신경 세포증, 세포 활성화의 장애) 및 고지혈증, 혈관 압축증, 비만, 암과 같은 경증 질환에 드물게 드물게



상기 식에서.

(a)는 (b) 또는 (c)이다.



명세서

#### 기술분야

본 발명은 비사이클릭 아미노 유도체 및 이들을 함유한 프로스타글란дин D<sub>2</sub>(본원 이하에서는 PGD<sub>2</sub>로 지칭)에 관한 것이다.

#### 배경기술

본 발명의 일부 비사이클릭 아미노 유도체는 트롬복산 A<sub>2</sub> (TXA<sub>2</sub>) 길항제로서 유용하다고 공지되어 있다(일본 특허 공고 제 93-79060 호 참고). 그러나, 일본 특허 공고 제 93-79060호에서는 상기 화합물이 TXA<sub>2</sub> 길항제로 유용하다고만 기술되어 있고, 본 발명에서 개시하는 바와 같이 PGD<sub>2</sub> 길항제로서의 그의 유용함을 제안하고 있지는 않다.

즉, TXA<sub>2</sub>는 혈소판 응집 반응, 혈전 형성 등에 대한 작용과 같은 활성을 갖고 있다고 공지되어 있다. 따라서 TXA<sub>2</sub> 길항제는 항혈전제로서 유용하고, 또한 TXA<sub>2</sub>에 대한 길항 작용에 의한 심근 경색 또는 천식의 치료에 유용하다고 생각되어 왔다.

한편, 본 발명의 PGD<sub>2</sub> 길항제는 PGD<sub>2</sub>의 과도한 생성으로 인한 상태를 개선시키는데 유용하다. 특히, 비만 세포의 기능 부전을 포함하는 질병(예: 전신성 비만 세포증 및 전신성 비만 세포 활성화의 장애) 및 기관 수축, 천식, 알러지성 비염, 알러지성 결막염, 두드러기, 허혈성 재관류로 인한 손상 및 염증의 치료용 약제로서 유용하다.

상기에서 알 수 있듯이, TXA<sub>2</sub> 길항제 및 PGD<sub>2</sub> 길항제는 활성 부위, 작용 메카니즘 및 용도에 있어서 서로 완전히 상이하고, 매우 상이한 특성을 갖는다. 따라서, 임의의 화합물이 이러한 활성을 동시에 소유하는 것은 예상하지 못했다.

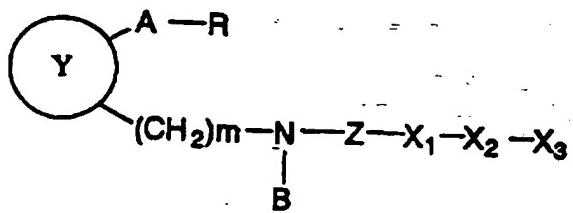
PGD<sub>2</sub>는 연역성 또는 비연역성 자극에 의해 활성화되는 사이클로옥시제네이즈의 작용에 의해 아라키돈산으로부터 PGG<sub>2</sub> 및 PGH<sub>2</sub>를 거쳐 제조되며, 비만 세포로부터 생성되고 방출되는 중요한 프로스타노이드이다. PGD<sub>2</sub>는 강력한 여러 생리학적 및 병리학적 활성을 갖는다. 예를 들어, PGD<sub>2</sub>는 심한 기관 수축의 원인이 되어 기관지 천식을 유발하기도 하고, 전신 알러지 상태에서 말초 혈관으로 퍼져 과민성 쇼크를 유발하기도 한다. 특히 PGD<sub>2</sub>가 알러지성 비염에서 코 폐색의 개시에 원인이 되는 뜯밖의 물질중의 하나라는 생각에 보다 많은 주의가 집중되어 왔다. 따라서, 코 폐색증을 감소시키기 위한 약제로서 PGD<sub>2</sub> 또는 PGD<sub>2</sub> 수용체의 길항물질의 생합성에 대한 억제제를 개발하는 것이 제안되었다. 그러나, PGD<sub>2</sub> 생합성의 억제제는 가능하게는 다른 생물체에서의 프로스타글란딘의 합성에 상당한 영향을 미치며, 따라서 PGD<sub>2</sub> 수용체에 특이적인 길항제(차단제)를 개발하는 것이 바람직하다.

#### [발명의 요약]

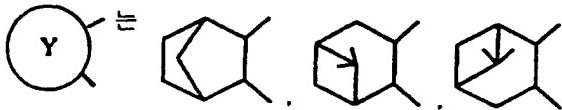
본 발명자들은 PGD<sub>2</sub> 수용체에 특이적인 PGD<sub>2</sub> 수용체 길항제(차단제)를 개발하는 것에 대해 집중 연구하여, 하기 화학식 I의 화합물 또는 그의 염이 PGD<sub>2</sub> 수용체 길항제로서 강력한 활성을 가지며 화학적 및 생화학적으로 안정함을 발견하였다.

따라서, 본 발명은 활성 성분으로서 하기 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물을 포함하는 PGD<sub>2</sub> 길항제를 제공한다:

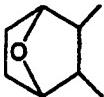
#### [화학식 I]



상기 식에서,



또는 이고,



A는 선택적으로 쇄중에 헤테로 원자 또는 페닐렌을 함유하고, 옥소기를 함유하거나, 불포화 결합을 갖는 알킬렌이고;

B는 수소, 알킬, 아르알킬 또는 아실이고;

R는 COOR<sub>1</sub>, CH<sub>2</sub>OR<sub>2</sub> 또는 CON(R<sub>3</sub>)R<sub>4</sub>이고;

R<sub>1</sub>은 수소 또는 알킬이고;

R<sub>2</sub>는 수소 또는 알킬이고;

R<sub>3</sub> 및 R<sub>4</sub>는 각각 독립적으로 수소, 알킬, 하이드록시 또는 알킬설폰일이고;

X<sub>1</sub>은 단일 결합, 페닐렌, 나프틸렌, 티오펜디일, 인돌디일 또는 옥사졸디일이고;

X<sub>2</sub>는 단일 결합, -N=N-, -N=CH-, -CH=N-, -CH=N-N-, -CH=N-O-, -C=NNHCSNH-, -C=NNHCONH-, -CH=CH-, CH(OH)-, -C(C1)=C(C1)-, -(CH<sub>2</sub>)<sub>n</sub>- 에탄일렌, -N(R<sub>5</sub>)-, -N(R<sub>51</sub>)CO-, -N(R<sub>52</sub>)SO<sub>2</sub>- , -N(R<sub>53</sub>)CON(R<sub>54</sub>)-, -CON(R<sub>55</sub>)-, -SO<sub>2</sub>N(R<sub>56</sub>)-, -O-, -S-, -SO-, -SO<sub>2</sub>- , -CO- 옥사디아졸디일, 티아디아졸디일 또는 테트라졸디일이고;

X<sub>3</sub>은 알킬, 알켄일, 알킨일, 아릴, 아르알킬, 헤테로사이클릭 기, 사이클로알킬, 사이클로알켄일, 티아졸린일리덴메틸.. 티아졸리딘일리덴메틸, -CH=NR<sub>6</sub> 또는 -N=C(R<sub>7</sub>)R<sub>8</sub>이고;

R<sub>5</sub>, R<sub>51</sub>, R<sub>52</sub>, R<sub>53</sub>, R<sub>54</sub>, R<sub>55</sub> 및 R<sub>56</sub>은 각각 수소 또는 알킬이고;

R<sub>6</sub>은 수소, 알킬, 하이드록시, 알콕시, 카바모일옥시, 티오카바모일옥시, 우레이도 또는 티오우레이도이고;

R<sub>7</sub> 및 R<sub>8</sub>은 각각 독립적으로 알킬, 알콕시 또는 아릴이고;

n은 1 또는 2이고;

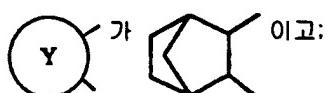
Z는 -SO<sub>2</sub>- 또는 -CO-이고;

m은 0 또는 1이며;

아울러, 사이클릭 치환체는 니트로, 알콕시, 설파모일, 치환된- 또는 비치환된-아미노, 아실, 아실옥시, 하이드록시, 할로겐, 알킬, 알킨일, 카복시, 알콕시카보닐, 아르알콜시카보닐, 아릴옥시카보닐, 메실옥시, 시아노, 알켄일옥시, 하이드록시알킬, 트리플루오로메틸, 알킬티오, -N=PPh<sub>3</sub>, 옥소, 티옥소, 하이드록시아미노, 알콕시아미노, 페닐 및 알킬렌디옥시로 구성된 그룹중에서 선택된 1 내지 3개의 치환체를 가질 수도 있다.

### 발명의 상세한 설명

PGD<sub>2</sub> 길항제로서 사용할 수 있는 화합물의 구체적인 예로는,



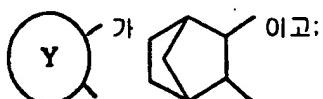
m이 0이고;

Z가 SO<sub>2</sub>이고;

$X_1$  및  $X_2$ 가 둘다 단일 결합이고:

$X_3$ 이 알킬, 페닐, 나프틸, 스틸릴, 쿠놀릴 또는 티엔일인(이들 치환체중 사이클릭 치환체는 선택적으로 니트로, 알콕시, 치환된- 또는 비치환된-아미노, 할로겐, 알킬 및 하이드록시알킬로 구성된 그룹중에서 선택된 1개지 3개의 치환체를 가짐) 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물이 있다.

유사하게, 구체적인 예로는

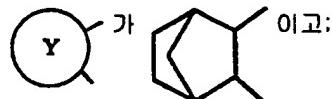


m이 10이고:

$X_1$  및  $X_2$ 가 둘다 단일 결합이고;

$X_3$ 이 선택적으로 할로겐으로 치환된 페닐인 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물이 있다.

유사하게, 구체적인 예로는



m이 10이고:

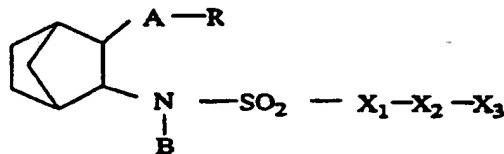
$X_1$ 이 페닐이고;

$X_2$ 가  $-CH_2-$  또는  $-N=N-$ 이고;

$X_3$ 이 페닐인 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물이 있다.

유사하게, 화학식 I의 화합물의 예로는 하기 화학식 Ia의 화합물 또는 그의 염 또는 이들의 수화물이 있다.

[화학식 Ia]



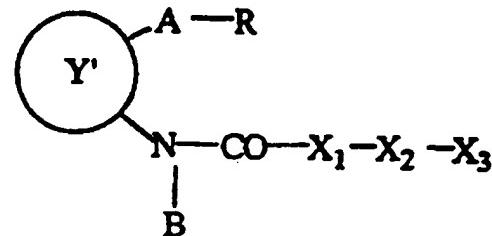
상기 식에서,

A, B, R,  $X_1$ ,  $X_2$  및  $X_3$ 은 화학식 I에 대하여 정의한 바와 같고,

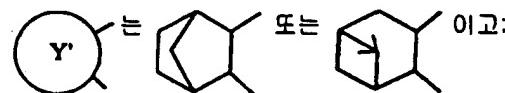
단, (1)  $X_1$  및  $X_2$ 가 단일 결합이고,  $X_3$ 이 치환된- 또는 비치환된-페닐 또는 나프틸인 경우와 (2) A가 5-헵텐일렌이고, R이 COOR<sub>1</sub>(이때, R<sub>1</sub>은 수소 또는 메틸임)이고,  $X_1$ 이 1,4-페닐렌이고,  $X_2$ 가 단일 결합이고,  $X_3$ 이 페닐인 경우를 제외한다.

유사하게, 화학식 I의 화합물의 예로는 하기 화학식 Ib의 화합물 또는 그의 염 또는 이들의 수화물이 있다:

[화학식 Ib]



상기 식에서,



A, B, R,  $X_1$ ,  $X_2$  및  $X_3$ 은 화학식 I에 대하여 정의한 바와 같고,

단,  $X_1$  및  $X_2$ 가 단일 결합이고,  $X_3$ 이 페닐인 경우와  $X_1$ 이 단일 결합이고,  $X_2$ 가  $-O-$ 이고,  $X_3$ 이 벤질인 경우를

제외한다.

보다 특정하게, 화학식 I의 화합물의 예로는  $X_1$  및  $X_2$ 가 단일 결합이고  $X_3$ 이 이속사출릴, 티아디아출릴, 이소티아출릴, 모풀릴, 인돌릴, 벤조푸릴, 디벤조푸릴, 디벤조디옥신일, 벤조티엔일, 디벤조티엔일, 카바줄릴, 크산텐일, 페난트리딘일, 디벤조옥세핀일, 디벤조티에핀일, 시놀일, 크로멘일, 벤즈이미다줄릴 또는 디하이드로벤조티에핀일인 화학식 Ja의 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다.

유사하게, 화학식 I의 화합물의 예로는  $X_1$ 이 단일 결합이고,  $X_2$ 가 페닐렌이고,  $X_3$ 이 알켄일, 알ки일,  $-CH=NR_6$  또는  $-N=C(R_7)R_8$ 인 화학식 Ib의 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다.

유사하게, 화학식 I의 화합물의 예로는  $R_1$ 이  $COOR_1$ 이고,  $X_1$ 이 페닐렌 또는 티오펜디일이고,  $X_2$ 가 단일 결합,  $-N=N-$ ,  $-CH=CH-$ ,  $-CONH-$ ,  $-NHCO-$  또는 에틴일렌이고,  $X_3$ 이 페닐, 티아졸린일리덴메틸, 티아졸리딘일리덴메틸 또는 티엔일인 화학식 Ia의 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다.

보다 특정하게, 본 발명의 화학식 I의 화합물의 예로는  가  인 화학식 Ib의 화합물 또는 그의

염 또는 이들의 수화물을 들 수 있다. 보다 바람직한 화합물의 예로는  $R_1$ 이  $COOR_1$ (이때  $R_1$ 은 상기 정의한 것과 같음)인 화학식 Ib의 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다.

유사하게, 화학식 I의 화합물의 예로는  $X_1$ 이 페닐렌 또는 티오펜디일이고,  $X_2$ 가 단일 결합,  $-N=N-$ ,  $-CH=CH-$ , 에틴일렌,  $-O-$ ,  $-S-$ ,  $-CO-$ ,  $-CON(R_{55})-$ (이때,  $R_{55}$ 은 상기 정의한 것과 같음),  $-N(R_{51})CO-$ (이때,  $R_{51}$ 은 상기 정의한 것과 같음)이고,  $X_3$ 이 페닐인 화학식 Ib의 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다.

보다 특정하게, 화학식 I의 화합물의 예로는  가  인 화학식 Ib의 화합물 또는 그의 염 또는

이들의 수화물을 들 수 있다. 보다 바람직한 양태의 예로는 B가 수소이고,  $X_1$  및  $X_2$ 가 둘다 단일 결합이고,  $X_3$ 이 티엔일, 티아졸릴, 티아디아졸릴, 이소티아졸릴, 피클일, 피리딜, 벤조푸릴, 벤즈이미다줄릴, 벤조티엔일, 디벤조푸릴, 디벤조티엔일, 퀴놀일 또는 인돌일인 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다. 유사하게 예로는  $X_1$ 이 페닐렌, 티오펜디일, 인돌디일 또는 옥사졸디일이고,  $X_2$ 가 단일 결합,  $-N=N-$ ,  $-CH=CH-$ , 에틴일렌,  $-S-$  또는  $-O-$ 이고,  $X_3$ 이 알릴 또는 헤테로사이클릭 기인 화합물 또는 그의 염 또는 이들의 수화물을 들 수 있다.

상기 화학식 Ia 또는 화학식 Ib의 화합물은 본 발명자들이 합성한 신규 화합물이다.

본 명세서 전체에서 사용되는 용어는 하기에서 정의하는 바와 같다.

'알킬렌'이라는 용어는  $C_1-C_9$ 의 직쇄 또는 분지쇄 알킬렌(예: 메틸렌, 메틸메틸렌, 디메틸메틸렌, 메틸에틸메틸렌, 에틸렌, 트리메틸렌, 테트라메틸렌, 펜타메틸렌, 헥사메틸렌, 헵타메틸렌, 옥타메틸렌, 노나메틸렌 등)을 의미한다. 상기 에틸렌은 쇄중에 헤테로 원자(들)(산소, 황, 질소 원자 등) 또는 페닐렌(예: 1,4-페닐렌, 1,3-페닐렌, 1,2-페닐렌 등)을 함유할 수 있고, 옥소기를 함유할 수 있고/있거나, 쇄중의 어느 위치에라도 하나 이상의 이중- 또는 삼중-결합을 가질 수 있다. 예로는,  $-(CH_2)_2-O-CH_2-$ ,  $-(CH_2)_2-O-(CH_2)_2-$ ,  $-(CH_2)_2-O-(CH_2)_3-$ ,  $-(CH_2)_2-O(CH_2)_4-$ ,  $-(CH_2)_2-O-(CH_2)_5-$ ,  $-(CH_2)_2-O-(CH_2)_6-$ ,  $-(CH_2)_2-S-(CH_2)_2-$ ,  $-(CH_2)_3-S-(CH_2)_2-$ ,  $-(CH_2)_2-S-CH_2-$ ,  $-(CH_2)_2-S-(CH_2)$

$4-$ ,  $-CH_2-N(CH_3)-CH_2-$ ,  $-CH_2-NH-(CH_2)_2-$ ,  $-(CH_2)_2-N(CH_2CH_3)-(CH_2)_3-$ ,  $-(CH_2)_2-1,4-$ -페닐렌- $CH_2-$ ,  $-(CH_2)_2-O-1,3-$ -페닐렌- $CH_2-$ ,  $-(CH_2)_2-O-1,2-$ -페닐렌- $CH_2-$ ,  $-(CH_2)_2-O-1$ , 4-페닐렌- $CH_2-$ ,  $-CH=CH-S-CH_2-$ , 4-페닐렌- $CH_2-$ ,  $-CH=CH-S-CH_2-$ , 1,3-페닐렌- $(CH_2)_2-$ , 2-옥소프로필렌-, 3-옥소펜틸렌, 5-옥소헥실렌, 비닐렌, 1-프로펜일렌, 2-프로펜일렌, 1-부텐일렌, 2-부텐일렌, 3-부텐일렌, 1,2-부타디엔일렌, 1,3-부타디엔일렌, 1-펜텐일렌, 2-펜텐일렌, 3-펜텐일렌, 4-펜텐일렌, 1,2-펜타디엔일렌, 1,3-펜타디엔일렌, 1,4-펜타디엔일렌, 2,3-펜타디엔일렌, 2,4-펜타디엔일렌, 1-헥센일렌, 2-헥센일렌, 3-헥센일렌, 4-헥센일렌, 5-헥센일렌, 1,2-헥사디엔일렌, 1,3-헥사디엔일렌, 1,4-헥사디엔일렌, 1,5-헥사디엔일렌, 2,3-헥사디엔일렌, 2,4-헥사디엔일렌, 2,5-헥사디엔일렌, 3,4-헥사디엔일렌, 3,5-헥사디엔일렌, 4,5-헥사디엔일렌, 1,1-디메틸-4-헥센일렌, 1-헵텐일렌, 2-헵텐일렌, 3-헵텐일렌, 4-헵텐일렌, 5-헵텐일렌, 2,2-디메틸-5-헵텐일렌, 6-헵텐일렌, 1,2-헵타디엔일렌, 1,3-헵타디엔일렌, 1,4-헵타디엔일렌, 1,5-헵타디엔일렌, 1,6-헵타디엔일렌, 2,3-헵타디엔일렌, 2,4-헵타디엔일렌, 2,5-헵타디엔일렌, 2,6-헵타디엔일렌, 3,4-헵타디엔일렌, 3,5-헵타디엔일렌, 3,6-헵타디엔일렌, 4,5-헵타디엔일렌, 4,6-헵타디엔일렌 또는 5,6-헵타디엔일렌, 1-프로핀일렌, 3-부틴일렌, 2-펜틴일렌, 5-헥신일렌, 6-헵틴일렌,  $-(CH_2)-CH=CH-O-(CH_2)_2-$ ,  $-CH_2-S-(CH_2)_3-$ ,  $-CH_2-$ 시스- $CH=CH-1,2-$ -페닐렌- $CH_2-$ ,  $-CH=CH-1,4-$ -페닐렌- $(CH_2)_2-$ , 4-옥소-4,5-헥센일렌 등을 들 수 있다.

'알킬'이라는 용어는  $C_1-C_{20}$ 의 직쇄 또는 분지쇄 알킬을 의미하고, 예로는 메틸, 에틸, n-프로필, i-프로필, n-부틸, i-부틸, s-부틸, t-부틸, n-펜틸, i-펜틸, 네오펜틸, t-펜틸, 헥실, 헵틸, 옥틸, 노닐, 데실, 운데실, 도

데실, 트리데실, 테트라데실, 펜타데실, 헥사데실, 헙타데실, 옥타데실, 노나데실, 이코실 등을 들 수 있다.

'아릴'이라는 용어는 C<sub>6</sub>-C<sub>14</sub>의 모노사이클릭 또는 축합 고리를 의미하고, 예로는 폐닐, 나프틸(예: 1-나프틸, 2-나프틸), 안트릴(예: 1-안트릴, 2-안트릴, 9-안트릴), 폐난트릴(예: 2-폐난트릴, 3-폐난트릴, 9-폐난트릴), 플루오렌일(예: 2-플루오렌일) 등을 들 수 있다. 폐닐이 특히 바람직하다.

'아르알킬'이라는 용어는 알킬중 임의의 치환가능한 위치에서 상기와 같이 정의한 알킬을 상기 아릴로 치환함으로써 형성된 기를 의미한다. 예로는 벤질, 펜에틸, 폐닐프로필(예: 3-폐닐프로필), 나프틸메틸(예: α-나프틸메틸), 안트릴메틸(예: 9-안트릴메틸), 폐난트릴메틸(예: 3-폐난트릴메틸) 등을 들 수 있다.

'아실'이라는 용어는 지방족 카복실산으로부터 유도된 C<sub>1</sub>-C<sub>9</sub>의 아실을 의미하고, 예로는 포르밀, 아세틸, 프로피온일, 부티릴, 발레릴 등을 들 수 있다.

'알킬설폰일'이라는 용어는설폰일을 상기 알킬로 치환함으로써 형성된 기를 의미하고, 예로는 메틸설폰일, 에틸설폰일, 프로필설폰일 등을 들 수 있다.

'알켄일'이라는 용어는 C<sub>2</sub>-C<sub>20</sub>의 직쇄 또는 분자쇄 알켄일을 의미하며 이는 하나 이상의 이중 결합을 함유하는 상기 알킬에 해당된다. 예로는 비닐, 1-프로펜일, 2-프로펜일, 1-부텐일, 2-부텐일, 3-부텐일, 1,2-부타디엔일, 1-펜텐일, 1,2-펜타디엔일, 2-헥센일, 1,2-헥사디엔일, 3-헵텐일, 1,5-헵타디엔일 등을 들 수 있다.

'알킨일'이라는 용어는 C<sub>2</sub>-C<sub>20</sub>의 직쇄 또는 분자쇄 알킨일로서 하나 이상의 삼중 결합을 함유하는 상기 알킬에 해당된다. 예로는, 에틴일, 1-프로핀일, 2-프로핀일, 1-부틴일, 2-부틴일, 3-부탄일 등을 들 수 있다.

'헤테로사이클릭 기'란 고리상에 산소, 황 및/또는 질소 원자로 구성된 그룹에서 독립적으로 선택된 하나 이상의 헤테로 원자를 함유하는 5원 내지 7원의 사이클릭 고리를 의미하며, 선택적으로 임의의 치환가능한 위치에서 탄소 고리 또는 다른 헤테로사이클릭 기와 축합된다. 예로는, 피콜일(예: 1-피콜일, 3-피콜일), 인돌일(예: 2-인돌일, 3-인돌일, 6-인돌일), 카바졸일(예: 2-카바졸일, 3-카바졸일), 이미다졸일(예: 1-이미다졸일, 4-이미다졸일), 피라졸일(예: 1-피라졸일, 3-피라졸일), 벤즈이미다졸일(예: 2-벤즈이미다졸일, 5-벤즈이미다졸일), 인다졸일(예: 3-인다졸일), 인돌리진일(예: 6-인돌리진일), 피리딜(예: 2-피리딜, 3-피리딜, 4-피리딜), 퀴놀일(예: 8-퀴놀일), 이소퀴놀일(예: 3-이소퀴놀일), 아크리딜(예: 1-아크리딜), 폐난트리딘일(예: 2-페난트리딘일, 3-페난트리딘일), 피리다진일(예: 3-피리다진일), 피리미딘일(예: 4-피리미딘일), 피라지일(예: 2-피라진일), 시놀린일(예: 3-시놀린일), 프탈라딘일(예: 5-프탈라딘일), 퀴나졸린일(예: 2-퀴나졸린일), 이속사졸일(예: 3-이속사졸일, 4-이속사졸일), 벤즈이속사졸일(예: 1,2-벤즈이속사졸-4-일, 2,1-벤즈이속사졸-3-일), 옥사졸일(예: 2-옥사졸일, 4-옥사졸일, 5-옥사졸일), 벤즈옥사졸일(예: 2-벤즈옥사졸일), 벤즈옥사디아졸일(예: 4-벤즈옥사디아졸일), 이소티아졸일(예: 3-이소티아졸일, 4-이소티아졸일), 벤즈이소티아졸일(예: 1,2-벤즈이소티아졸-3-일, 2,1-벤즈이소티아졸-5-일), 티아졸일(예: 2-티아졸일), 벤조티아졸일(예: 2-벤조티아졸일), 티아디아졸일(예: 1,2,3-티아디아졸-4-일), 옥사디아졸일(예: 1,3,4-옥사디아졸-2-일), 디하이드로옥사디아졸일(예: 4,5-디하이드로-1,2,4-옥사디아졸-3-일), 푸릴(예: 2-푸릴, 3-푸릴), 벤조푸릴(예: 3-벤조푸릴), 이소벤조푸릴(예: 1-이소벤조푸릴), 티엔일(예: 2-티엔일, 3-티엔일), 벤조티엔일(예: 1-벤조티오펜-2-일, 2-벤조티오펜-1-일), 테트라졸일(예: 5-테트라졸일), 벤조디옥솔일(예: 1,3-벤조디옥솔-5-일), 디벤조푸릴(예: 2-디벤조푸릴, 3-디벤조푸릴), 디벤즈옥세핀일(예: 디벤즈[b,f]옥세핀-2-일), 디하이드로디벤즈옥세핀일(예: 디하이드로디벤즈[b,f]옥세핀일-2-일), 크로멘일(예: 2H-크로멘-3-일, 4H-크로멘-2-일), 디벤조티에핀일(예: 디벤조[b,f]티에핀-3-일, 디하이드로디벤조[b,f]티에핀-3-일), 모풀린일(예: 1,4-몰포린-4-일), 폐노티아단일(2-폐노티아단일), 사이클로펜타티엔일(예: 사이클로펜타[b]티오펜-3-일), 사이클로헥사티엔일(예: 사이클로헥사[b]티오펜-3-일) 등을 들 수 있다.

'사이클로알킬': 이라는 용어는 C<sub>3</sub>-C<sub>8</sub>의 사이클릭 알킬을 의미하고, 예로는 사이클로프로필, 사이클로부틸, 사이클로펜틸, 사이클로헥실 등을 들 수 있다.

'사이클로알켄일'이라는 용어는 C<sub>3</sub>-C<sub>8</sub>의 사이클릭 알켄일을 의미하고, 예로는 사이클로프로펜일(예: 1-사이클로프로펜일), 사이클로부텐일(예: 2-사이클로부텐-1-일), 사이클로펜텐일(1-사이클로펜텐-1-일), 사이클로헥센일(예: 1-사이클로헥센-1-일) 등을 들 수 있다.

'알콕시'라는 용어는 C<sub>1</sub>-C<sub>6</sub>의 알콕시를 의미하고, 예로는 메톡시, 에톡시, n-프로록시, i-프로록시, n-부록시 등을 들 수 있다.

'치환된- 또는 비치환된-아미노'라는 정의에 있어서 치환된 아미노의 예로는 단일- 또는 이-치환된 아미노(예: 메틸아미노, 에틸아미노, 디메틸아미노, 사이클로헥실아미노, 폐닐아미노, 디폐닐아미노) 또는 사이클릭 아미노(예: 피페리디노, 피페라디노 또는 모풀리노)를 들 수 있다.

'아실옥시'라는 용어는 상기 '아실'로부터 유도된 아실옥시를 의미하고, 예로는 아세틸옥시, 프로피온일옥시, 부티릴옥시, 발레릴옥시 등을 들 수 있다.

'할로겐'이라는 용어는 불소, 염소, 브롬 및 요오드를 의미한다.

'알콕시카보닐'이라는 용어는 상기 '알콕시'로부터 유도된 알콕시카보닐 기를 의미하고, 예로는 메톡시카보닐, 에톡시카보닐, 폐닐옥시카보닐 등을 들 수 있다.

'아르알킬옥시카보닐'이라는 용어는 상기 '아르알킬'로부터 유도된 아르알킬 옥시카보닐 기를 의미하고, 예로는 벤질옥시카보닐, 펜에틸옥시카보닐 등을 들 수 있다.

'아릴옥시카보닐'이라는 용어는 상기 '아릴'로부터 유도된 아릴옥시카보닐 기를 의미하고, 예로는 폐닐옥시

카보닐, 나프틸옥시카보닐 등을 의미한다.

'알켄일옥시'라는 용어는 상기 '알켄일'로부터 유도된 알켄일옥시기를 의미하고, 예를 들면 비닐옥시, 1-프로펜일옥시, 2-부텐일옥시 등을 들 수 있다.

'하이드록시알킬'이라는 용어는 상기 '알킬'로부터 유도된 하이드록시알킬기를 의미하고, 예로는 하이드록시메틸, 하이드록시에틸, 하이드록시프로필 등을 들 수 있다.

'알킬티오'라는 용어는 상기 '알킬'로부터 유도된 알킬티오기를 의미하고, 예로는 메틸티오, 에틸티오, 프로필티오 등을 들 수 있다.

'알킬렌디옥시'라는 용어는 C<sub>1</sub>-C<sub>3</sub>의 알킬렌디옥시기를 의미하고, 예로는 메틸렌디옥시, 에틸렌디옥시, 프로필렌디옥시 등을 들 수 있다.

'페닐렌', '나프틸렌', '티오펜디일', '인돌디일', '옥사졸디일', '옥사디아졸디일' 및 '테트라졸디일'의 경우, 상기 기는 임의의 두 치환가능한 부위에서 이웃하는 기에 결합될 수 있다.

상기 정의에서, 치환체가 사이클릭인 경우, 니트로, 알콕시, 살파모일, 치환된- 또는 비치환된-아미노, 아실, 아실옥시, 하이드록시, 할로겐, 알킬, 알킬, 카복시, 알콕시카보닐, 아르알콕시카보닐, 아릴옥시카보닐, 메실옥시, 시아노, 알켄일옥시, 하이드록시알킬, 트리플루오로메틸, 알킬티오, N=PPh<sub>3</sub>, 옥소, 티옥소, 하이드록시아미노, 알콕시아미노, 페닐 및 알킬렌디옥시중에서 선택된 1 내지 3개의 치환체로 치환될 수도 있다. 치환체는 고리상의 임의의 치환가능한 위치에 결합될 수도 있다.

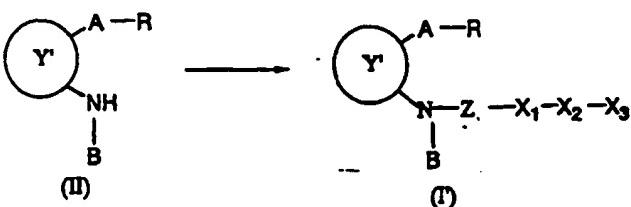
화학식 I의 임의 예로는 알칼리 금속(예: 리튬, 나트륨 또는 칼륨), 알칼리 토금속(예: 칼슘), 유기 염기(예: 트로메트아민, 트리에틸아민, 트리에틸아민, 2-아미노부탄, t-부틸아민, 디이소프로필에틸아민, n-부틸에틸아민, 사이클로헥실아민, 디사이클로헥실아민, N-이소프로필사이클로헥실아민, 푸르푸릴아민, 벤질아민, 메틸벤질아민, 디벤질아민, N,N-디메틸벤질아민, 2-클로로벤질아민, 4-메톡시벤질아민, 1-나프틸렌에틸아민, 디페닐벤질아민, 트리페닐아민, 1-나프틸아민, 1-아미노안트라센, 2-아미노안트라센, 디하이드로아비에틸아민, N-메틸모풀린 또는 피리딘), 아미노산(예: 리신 또는 아르기닌) 등으로 형성된 염을 들 수 있다.

'수화물'이라는 용어는 화학식 I의 화합물을 또는 그의 염의 수화물을 의미한다. 예로는 일- 및 이-수화물을 들 수 있다.

본 발명의 화합물은 화학식 I로 표현되고 입체 이성질체(예: 부분입체 이성질체, 에피머, 거울상 이성질체) 및 라세미 화합물의 임의의 유형을 포함한다.

화학식 I의 화합물 중, m=1인 화합물, 특히 하기 표 3b 및 3c에서 제시한 화합물은 일본 특허 공개 공보 제90-180862호에서 기술된 공지의 화합물이다.

화학식 I의 화합물 중, m=0인 화합물(하기 일반식(I')로 표현된 화합물)은 하기 일반식(II)의 아미노 화합물을, 부분 구조가 하기 Z-X<sub>1</sub>-X<sub>2</sub>-X<sub>3</sub>에 상응하는 살포산 또는 카복실산의 반응성 유도체와 반응시켜 제조할 수 있다:



상기 식에서, A, B, R, X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, Y 및 Z는 상기 정의한 것과 같다.

부분 구조가 Z-X<sub>1</sub>-X<sub>2</sub>-X<sub>3</sub>에 상응하는 살포산은 일반식 X<sub>3</sub>-X<sub>2</sub>-X<sub>1</sub>-SO<sub>2</sub>OH의 화합물이고, 상기 부분 구조에 상응하는 카복실산은 일반식 X<sub>3</sub>-X<sub>2</sub>-X<sub>1</sub>-COOH의 화합물이다. 이러한 살포산 또는 카복실산의 반응성 유도체는 상응하는 할라이드(예: 클로라이드, 브로마이드, 요오다이드), 산 무수물(예: 포ーム산 또는 아세트산의 혼합된 산무수물), 활성 에스테르(예: 속신아미드 에스테르)를 의미하고, 그 예로는 일반적으로 아미노기의 아실화에 사용되는 아실화제를 들 수 있다. 카복실산(X<sub>3</sub>-X<sub>2</sub>-X<sub>1</sub>-COOH)은 아민과 카복실산의 축합 반응에서 사용되는 축합제(예: 디사이클로헥실카보디아이미드(DCC), 1-에틸-3-(3-디메틸아미노프로필)카보디아이미드, N, N'-카보닐디아이미다졸의 존재하에 이를 반응성 유도체로 변환시키지 않고 그대로 반응에 사용할 수 있다.

상기 반응은 아미노기의 아실화에 일반적으로 사용되는 조건하에서 수행될 수 있다. 예로는 할라이드 산을 사용하는 축합의 경우에, 에테르 용매(예: 디에틸에테르, 테트라하이드로푸란, 디옥산), 벤젠 용매(예: 벤젠, 툴루엔, 크릴렌), 할로겐화된 탄화수소 용매(예: 디클로로에탄, 디클로로에탄, 클로로포름), 에틸 아세테이트, 디메틸포름아이드, 디메틸 살포사이드, 아세토니트릴 등과 같은 용매를 사용하여, 필요하다면 염기(예컨대, 유기 염기(예: 트리에틸아민, 피리딘, N,N-디메틸아미노피리딘, N-메틸모풀린), 무기 염기(예: 나트륨 하이드록사이드, 칼륨 하이드록사이드, 칼륨 카보네이트 등))의 존재하에 실온에서, 냉각하면서 또는 바람직하게는 -20°C 내지 냉각하의 온도에서 또는 실온 내지 반응계의 환류 온도에서 가열하면서, 수 분 또는 수 시간 동안, 바람직하게는 0.5 시간 내지 24시간, 보다 바람직하게는 1 시간 내지 12시간동안 수행된다.

다른 반응성 유도체 또는 유리 산과 아민(II)의 반응을 위한 반응 조건은 반응성 유도체 또는 유리 산의 각각의 특징에 따라 통상의 방식으로 결정할 수 있다.

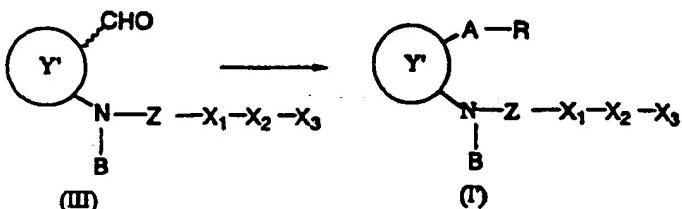
있다.

본 발명의 방법의 출발 물질인 화합물(II)의 구체적인 예는 다음과 같다. 3-아미노[2.2.1]비사이클릭 화합물의 예로는 7-(3-아미노비사이클로[2.2.1]헵트-2-일)-5-헵텐산, 7-(3-아미노비사이클로[2.2.1]헵트-2-일)-2,2-디메틸-5-헵텐산, 7(N-메틸-3-아미노비사이클로[2.2.1]헵트-2-일)-5-헵텐산, 6-(3-아미노비사이클로[2.2.1]헵트-2-일)-5-헥센산을 들 수 있다. 2-아미노-6,6-디메틸[3.1.1]비사이클릭 화합물의 구체적인 예로는 7-(2-아미노-6,6-디메틸비사이클로[3.1.1]헵트-3-일)-5-헵텐산을 들 수 있다. 이러한 출발 물질에서, 헵텐산 쇄를 포화시켜 헵탄산 쇄를 형성할 수도 있고, 쇄중에 헤테로 원자(들) 또는 헤테로기(들)(예: -O-, -S-, -NH- 또는 페닐렌)를 포함할 수도 있고, 옥소기로 치환될 수도 있다. 이러한 화합물의 예로는 7-(3-아미노비사이클로[2.2.1]헵트-2-일)헵탄산, 4-[2-(2-아미노비사이클로[3.3.1]헵트-3-일)에톡시 페닐아세트산, 7-(3-아미노비사이클로[2.2.1]헵트-2-일)-6-옥소-헵탄산을 들 수 있다. 이러한 출발 물질은 일본 특허 공보 공보 제 93-79060 호 또는 제 91-23170호에 기술되어 있거나 또는 본원에 기술되어 있는 방법에 따라 제조할 수 있다.

상기 부분 구조( $Z-X_1-X_2-X_3$ )에 상응하는 설폰산( $X_3-X_2-X$ )

,  $-SO_2OH$ ) 및 카복실산 ( $X_3-X_2-X_1-COOH$ )은 상기 X에 상응하는 치환체를 갖는 설폰산 또는 카복실산을 의미한다. 즉, 예로는 알칸-설폰산 또는 -카복실산, 알켄-설폰산 또는 -카복실산, 알린-설폰산 또는 -카복실산, 사이클로알칸-설폰산 또는 -카복실산, 사이클로알칸-설폰산 또는 -카복실산, 아릴-설폰산 또는 -카복실산, 아릴알킬옥시-설폰산 또는 -카복실산, 헤테로사이클릭 치환된-설폰산 또는 -카복실산, 헤테로아릴알킬-설폰산 또는 -카복실산 및 치환된-아미노-설폰산 또는 -카복실산을 들 수 있다. 설폰산 또는 카복실산은 각각 상기 치환체(들)를 가질 수도 있다. 이러한 설폰산 및 카복실산은 시판중이거나 또는 공지된 방법에 따라 공지된 화합물을 부터 쉽게 합성할 수 있다. 반응하자마자, 설폰산 또는 카복실산은 필요한 경우, 상기 상응하는 반응성 유도체로 변환될 수 있다. 예를 들어, 산 할라이드가 필요한 경우, 문헌 [Shin-Jikken-Kagaku-Koza, vol. 14, 1787 페이지 (1978); Synthesis, 854-854(1986); Shin-Jikken-Kagaku-Koza, vol. 22, 115 페이지 (1992)]에서 기술하는 바와 같은 공지된 방법에 따라 화합물을 티온일 할라이드(예: 티온일 클로라이드), 인 할라이드(예: 삼염화인, 오염화인) 또는 옥살릴 할라이드(예: 옥살릴 클로라이드)와 반응시킨다. 다른 반응성 유도체 또한 공지된 방법으로 제조될 수 있다.

목적하는 화학식 I의 화합물중에서, 측쇄 A가 불포화 결합, 특히 이중 결합을 함유하는 화합물은 하기 일반식(III)의 알데하이드 유도체를 측쇄 A-R의 나머지 부분에 상응하는 일라이드 화합물과 비티히(Wittig) 반응 조건하에서 반응시켜 제조할 수 있다:



상기 식에서, A, B, R, X<sub>1</sub>, X<sub>2</sub>, X<sub>3</sub>, Y 및 Z는 상기 정의한 바와 같다.

출발 화합물(III)은 예를 들어 일본 특허 공개 공보 제 90-256650호에 기술된 방법에 따라 제조될 수 있다. 또한, 측쇄 A-R의 나머지 부분에 상응하는 일라이드 화합물은 트리페닐포스핀을 상응하는 할로겐화된 알칸 산 또는 그의 에스테르 유도체, 에테르 유도체 또는 아미드 유도체와 공지된 방법에 따라 엉기의 존재하에서 반응시켜 합성할 수 있다.

목적하는 화학식 I의 화합물중에서, R이 COOH인 화합물은 바람직한 경우 상응하는 에스테르 유도체, 알콜 유도체, 에테르 유도체, 아미드 유도체로 전환될 수 있다. 예를 들어, 에스테르 유도체는 카복실산을 종래의 방법으로 에스테르화하여 제조할 수 있다. 에스테르 유도체는 환원되는 경우, 알콜 유도체를 형성하고, 아미드화되는 경우, 아미드 유도체를 형성한다. 에테르 유도체는 알콜 유도체를 O-알킬화시켜 수득할 수 있다.

본 발명의 화학식 I의 화합물은 PGD<sub>2</sub> 수용체에 결합됨으로써 시험관내에서 PGD<sub>2</sub>에 대한 길항 효과를 나타내고, PGD<sub>2</sub>의 과다한 생성으로 인한 비만 세포의 기능 부전과 관련된 질병을 치료하기 위한 약제로서 유용하다. 예를 들어, 화학식 I의 화합물은 비만 세포의 기능 부전을 포함하는 질병의 치료용 약제로서 유용하다. 예를 들어, 화학식 I의 화합물을 전신성 비만 세포증 및 전신성 비만 세포 활성화의 장애 및 기관 수축, 천식, 알러지성 비염, 알러지성 결막염, 두드러기, 허혈성 재관류로 인한 손상 및 염증과 같은 질병을 치료하기 위한 약제로서 유용하다. 화학식 I의 화합물은 생체내에서 코의 폐색증에 대해 예방 효과를 보이고, 따라서 그를 치료하는 약제로서 특히 유용하다.

치료에 본 발명의 화학식 I의 화합물을 사용하는 경우, 화합물은 경구 및 비경구 투여를 위한 일반적인 제형으로 제형화될 수 있다. 본 발명의 화학식 I의 화합물을 함유하는 약학 조성물은 경구 및 비경구 투여를 위한 형태일 수 있다. 특히, 상기 화합물은 정제, 캡슐, 과립, 분말, 시럽 등과 같은 경구 투여용 제형 및 정맥내, 근육내 또는 피하 주사용 주사 용액 또는 혼입제, 안약, 비강 점액, 좌제와 같은 비경구 투여용 제형 또는 연고와 같은 경피 제형으로 제형화될 수 있다.

제형을 제조하는데 있어서, 당분야의 일반적인 숙련자들에게 공지되어 있는 담체, 부형제, 용매 및 염기를 사용할 수도 있다. 정제의 경우, 보조 성분과 함께 활성 성분을 압착하거나 또는 배합함으로써 제조한다. 유용한 보조 성분의 예로는 결합제(예: 옥수수 전분), 충전제(예: 락토즈, 미정질 셀룰로즈), 봉해제(예: 전분나트륨 글리콜레이트) 또는 윤활제(예: 마그네슘 스티아레이트)와 같은 약학적으로 허용가능한 부형제를 들 수 있다. 정제는 적절하게 피복될 수도 있다. 시럽, 용액 또는 혼탁액과 같은 액체 제형의 경우, 혼탁제(예: 매

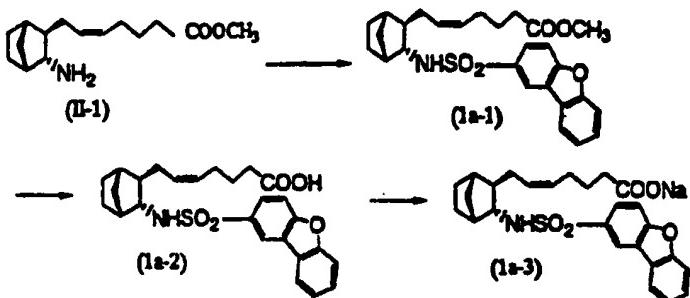
틸 셀룰로즈), 유화제(예: 레시틴), 방부제 등을 포함할 수도 있다. 주사용 제형의 경우, 이는 혼탁액-안정화제 또는 분산제 등을 함유할 수도 있는 용액 또는 혼탁액, 또는 오일상 또는 수성 유화액의 형태일 수 있다. 흡입제의 경우, 흡입기에 적절한 액체 제형으로 제형화된다. 안약의 경우, 용액 또는 혼탁액으로 제형화된다. 특히, 코의 폐색증의 치료를 위한 비강 약제의 경우, 종래의 제형화 방법으로 제조된 용액 또는 혼탁액으로서 또는 분말제(예: 하이드록시프로필 셀룰로즈, 카보풀)를 사용하여 제형화한 분말로서 사용할 수 있으며, 코의 공동내로 투여된다. 선택적으로, 낮은 비정의 용매와 함께 특별한 용기에 충전시킨 후 에어로졸로서 사용할 수도 있다.

화학식 I의 화합물의 적절한 투여량은 투여 경로, 환자의 연령, 체중, 성별 또는 상태 및 함께 사용되는 약제의 종류(있는 경우)에 따라 변하기 때문에 결국 의사의 처방에 따라야 하지만, 경구 투여의 경우, 1일 사용량은 일반적으로 체중 1kg 당 약 0.01 내지 100mg, 바람직하게는 약 0.01 내지 10mg, 보다 바람직하게는 약 0.1 내지 10mg일 수 있다. 비경구 투여의 경우, 1일 투여량은 일반적으로 체중 1kg당 약 0.001 내지 100mg, 바람직하게는 약 0.001 내지 1mg, 보다 바람직하게는 약 0.01 내지 1mg일 수도 있다. 1일 투여량은 1 내지 4회로 나누어 투여될 수 있다.

하기의 실시에는 본 발명을 추가로 설명하기 위해 제공된 것인지, 본 발명의 범주를 제한하려는 것은 아니다.

#### [실시예]

##### [실시예 1]



메틸 (Z)-7-[1S, 2R, 3R, 4R]-3-아미노비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트(II-1) (251mg, 1.00 mmol)를 메틸렌 클로라이드 (8mL)에 용해시키고, 질소 분위기하에서 트리에틸아민(0.238 mL, 2.00 mmol)을 첨가하였다. 빙냉하에서 혼합물을 2-클로로설포닐벤조푸란(350mg, 1.31 mmol)을 첨가하고, 이 혼합물을 30분 동안 교반하고 실온까지 가온하였다. 반응 혼합물을 실리카 젤상에서 컬럼크로마토그래피(*n*-헥산/에틸 아세테이트 (1:4))에 의해 정제하였고, *n*-헥산(10mL)으로 재결정화하여 메틸 (Z)-7[(1S, 2R, 3R, 4R)-3-(2-디벤조푸릴)설포닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트(1a-1)(342 mg, 0.710 mmol)를 수득하였다.

수율 : 71%. 융점(mp) : 115-116°C.

원소분석(C<sub>27</sub>H<sub>31</sub>NO<sub>5</sub>S)

계산치 (%): C, 67.34; H, 6.49; N, 2.91; S,

측정치 (%): C, 67.16; H, 6.47; N, 2.99; S,

IR (CHCl<sub>3</sub>): 3382, 3024, 2952, 2874, 1726, 1583, 1465, 14

, 1121, 1104, 1071, 1019, 890, 840, 817 /cm.

<sup>1</sup>H NMR (CDCl<sub>3</sub>) δ: 0.94-1.92(14H, m), 2.15-2.24(3H, m)

3.66(3H, s), 4.98(1H, d, J=6.6Hz), 5.10-5.22(2H, m), 7

7.46(1H, m), 7.51-7.70(3H, m), 7.87-8.13(2H, m), 8.53

[\alpha]<sub>D</sub>=-0.6° (CHCl<sub>3</sub>, c=1.01%, 23°C).

([\alpha]<sub>D</sub>=+37.0° (CHCl<sub>3</sub>, c=1.01%, 23°C))

메틸 (Z)-7-[1S, 2R, 3R, 4R]-3-(2-디벤조푸릴)-설포닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트 (1a-1)(234 mg, 0.50 mmol)를 메탄ол(6mL)/테트라하이드로푸란(4mL)에 용해시켰다. 빙냉하에서 용액에 1N 칼륨 하이드록사이드 (1.50 mL, 1.50 mmol)를 첨가하였다. 반응 혼합물을 실온까지 가온한 다음, 16시간 동안 반응시키고 농축시켜 용매를 제거하였다. 잔류물에 에틸 아세테이트(50 mL) 및 물 (10 mL)을 첨가하고 그 단을 1N HCl(2.00 mL, 2.00 mmol)을 첨가한 후, 용액을 분리하였다. 용액을 풀어서 곡

IR (CHCl<sub>3</sub>): 3266, 3026, 2952, 2874, 1708, 1463, 1443, 1423, 1319,

1267, 1245, 1153, 1121, 1104, 1072, 906 /cm.

<sup>1</sup>H NMR (CDCl<sub>3</sub>)δ: 0.93-1.94(14H, m), 2.12-2.19(1H, m), 2.26(2H, t,

J=7.2Hz), 3.00-3.08(1H, m), 5.12-5.25(2H, m), 5.26(1H, d, J=6.6Hz),

7.38-7.45(1H, m), 7.51-7.70(3H, m), 7.87-8.13(2H, m), 8.54(1H, d,

J=2.1Hz).

[α]<sub>D</sub>+6.8° (CHCl<sub>3</sub>, c=1.08 %, 23 °C).

(Z)-7-[(1S, 2R, 3R, 4R)-3-(2-디벤조푸릴)설포닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵텐산(1a-2) (453 mg, 0.97 mmol)을 메탄올 (5mL)에 용해시켰다. 1N 나트륨 메톡사이드/메탄올 (1.034 N, 0.937 mL, 0.97 mmol)을 첨가한 후, 혼합물을 실온까지 가온하고 1시간 동안 반응시켰다. 증류에 의해 용매를 제거하여, 나트륨염(1a-3) (457 mg, 0.933 mmol)을 수득하였다.

수율 : 96%, 비정질 분말.

원소 분석 (C<sub>26</sub>H<sub>28</sub>NO<sub>5</sub>SNa 0.6H<sub>2</sub>O)

계산치 (%) : C, 62.41; H, 5.88; N, 2.80; S, 6.41; Na, 4.59

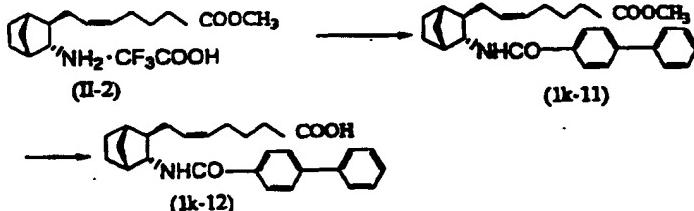
측정치 (%) : C, 62.45; H, 5.92; N, 2.99; S, 6.49; Na, 4.46

IR (KBr) : 434, 3280, 3074, 3007, 2952, 2873, 1566, 1467, 1444, 1417, 1344, 1315, 1270, 1248, 1200, 1189, 1154, 1124, 1107, 1075, 1058, 895, 842, 818 /cm.

<sup>1</sup>H NMR (CD<sub>3</sub>OD)δ: 1.02-2.05(16H, m), 2.16-2.23(1H, m), 2.94-3.00(1H, m), 4.98-5.05(2H, m), 7.41-7.48(1H, m), 7.53-7.62(1H, m), 7.66(1H, d, J=8.4Hz), 7.77(1H, d, J=8.4Hz), 8.57(1H, d, J=2.1Hz).

[α]<sub>D</sub>-15.2° (CH<sub>3</sub>OH, c=1.07 %, 22 °C).

### [실시예 2]



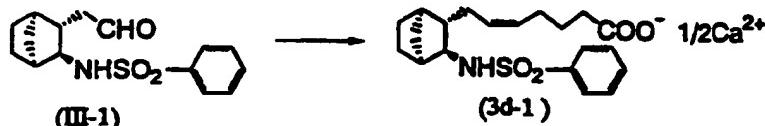
일본 특허 공고 공보 제 93-79060 호의 대조에 4에서 기술한 방법으로 제조한 메틸 (Z)-7[(1S, 2R, 3R, 4R)-3-아미노비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트 트리플루오로아세테이트(II-2) (232 mg, 0.636 mmol)를 메틸렌 클로라이드(5 mL)에 용해시켰다. 냉장하에서 이 용액에 트리에틸아민(0.279 mL, 2.00 mmol) 및 4-비페닐카보닐 클로라이드를 첨가하고, 동일 온도에서 7시간동안 교반하였다. 반응 혼합물을 실리카 겔상에서 칼럼 크로마토그래피(에틸 아세테이트/n-헥산 (1:4))에 의해 정제하여 (Z)-7[(1S, 2R, 3R, 4R)-3-(4-비페닐)카보닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트(1k-11) (221 mg, 0.512 mmol)를 수득하였다. 화합물(1K-11) (190 mg, 0.440 mmol)을 메탄올 (6mL)에 용해시켰다. 냉장하에서 용액에 1N KOH(1.10 mL, 1.10 mmol)를 첨가하고 실온에서 15시간동안 교반하였다.

진공하에서 반응 혼합물을 농축시켰다. 물 (20 mL) 및 1N HCl(2 mL)을 첨가한 후, 잔류물을 에틸 아세테이트로 추출하였다. 유기층을 포화 염수로 세척하고, 무수 나트륨 살피아이트로 건조시킨 후, 농축시켰다. 잔류물을 실리카 겔상에서 칼럼 크로마토그래피(0.3% 아세트산을 함유하는 에틸 아세테이트/헥산 (1:1))에 의해 정제하여 (Z)-7[(1S, 2R, 3R, 4R)-3-(4-비페닐)카보닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵텐산(1k-12) (172 mg, 0.412 mmol)을 수득하였다.

수율: 94%.

또한, 하기의 화합물을 하기의 방법으로 제조할 수 있다.

### [실시예 3]



질소 분위기하의 실온에서 4-카복시부틸트리페닐포스포늄 브로마이드(14.8 g 33.3 mmol) 및 테트라하이드로푸란(80 mL)의 혼탁액에 칼륨 3급-부티레이트(7.55g, 67.3 mmol)를 첨가하였다. 실온에서 1시간 동안 교반한 후, 혼합물을 -20°C로 냉각시키고, 테트라하이드로푸란(20mL)내 N-[*(1S, 2S, 3S, 4R)-3-포르밀메틸비사이클로[2.2.1]헵트-2-일]벤젠설플론아미드(III-1) (일본 특허 공개 공보 제 90-256650 호, 대조예 2) (3.25 g, 11.1 mmol)를 천천히 첨가하였다. -20°C에서 약 1시간 동안 교반한 후, 냉용을 제거하고, 1시간 동안 추가로 혼합물을 교반하였다. 반응 용액에 2N HCl를 첨가하고, 혼합물을 에틸 아세테이트로 추출하고, 물 및 염수로 세척한 후 농축시켰다. 툴루엔 및 1N 나트륨 하이드록사이드를 생성된 조질의 생성물에 첨가한 후 수성층을 분리하였다. 유기층을 물로 다시 세척하고, 세척액을 앞서 얻은 수성층과 합쳤다. 2N HCl를 첨가한 후, 수용액을 에틸 아세테이트로 추출하였다. 추출물을 물 및 염수로 세척하고, 나트륨 살피아트로 건조시킨 후 농축시켰다. 잔류물을 실리카 겔상에서 컬럼 크로마토그래피에 의해 정제하여 칼슘(Z)-7-[*(1R, 2S, 3S, 4S)-3-페닐설플로닐아미노비사이클로[2.2.1]헵트-2-일]-5-헵테노에이트(1d-1) (3.29 g)를 수득하였다.**

수율 : 79%, mp : 62°C.

원소 분석 : ( $C_{20}H_{27}NO_4S$ )

계산치 (%) : C, 63.63; H, 7.21; N, 3.71; S, 8.49

측정치 (%) : C, 63.56; H, 7.21; N, 3.83; S, 8.43

$[\alpha]_D^{25} = +5.3 \pm 0.5^\circ$  (CHCl<sub>3</sub>, c=1.003 g, 22°C)

$[\alpha]_D^{25} = +27.1 \pm 0.7^\circ$  (MeOH, c=1.015 g 24 °C)

IR( 뉴풀 ) 3282, 3260, 3300, 2400, 1708, 1268, 1248, 1202, 1162, 1153, 1095, 1076/cm.

<sup>1</sup>H NMR δ 0.88-2.10(m, 14H), 2.14(br s, 1H), 2.34(t, J=7.2Hz, 2H),

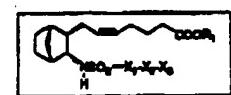
2.95-3.07(m, 1H), 5.13-5.35(m, 3H), 7.45-7.64(m, 3H), 7.85-7.94(m, 2H), 9.52(br s, 1H).

상기 실시예에서 기술한 방법에 따라 제조된 화합물을 하기 표에 제시하였다.

표 1a

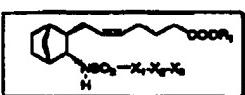
No.	$R_1$	$X_1-X_2-X_3$		
			Chemical Structure	Notes
1a-1	CH <sub>3</sub>			
1a-2	H			
1a-3	NH			
1a-4	CH <sub>3</sub>			
1a-5	H			
1a-6	CH <sub>3</sub>			
1a-7	H			
1a-8	CH <sub>3</sub>			
1a-9	H			
1a-10	CH <sub>3</sub>			
1a-11	H			
1a-12	CH <sub>3</sub>			
1a-13	H			
1a-14	CH <sub>3</sub>			
1a-15	H			
1a-16	CH <sub>3</sub>			
1a-17	H			
1a-18	CH <sub>3</sub>			
1a-19	H			
1a-20	CH <sub>3</sub>			
1a-21	H			
1a-22	H			
1a-23	H			

표 1a (계속)



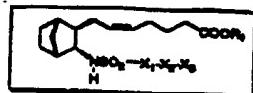
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1a-34	CH <sub>3</sub>	
1a-35	H	-
1a-36	H	-
1a-37	CH <sub>3</sub>	-
1a-38	H	-
1a-39	CH <sub>3</sub>	-
1a-40	H	-
1a-41	CH <sub>3</sub>	-
1a-42	H	-
1a-43	CH <sub>3</sub>	-
1a-44	H	-
1a-45	CH <sub>3</sub>	-
1a-46	H	-
1a-47	CH <sub>3</sub>	-
1a-48	H	-
1a-49	CH <sub>3</sub>	-
1a-50	H	-
1a-51	CH <sub>3</sub>	-
1a-52	H	-
1a-53	CH <sub>3</sub>	-
1a-54	H	-
1a-55	CH <sub>3</sub>	-
1a-56	H	-
1a-57	CH <sub>3</sub>	-
1a-58	H	-
1a-59	CH <sub>3</sub>	-
1a-60	H	-
1a-61	CH <sub>3</sub>	-
1a-62	H	-
1a-63	CH <sub>3</sub>	-
1a-64	H	-
1a-65	CH <sub>3</sub>	-
1a-66	H	-
1a-67	CH <sub>3</sub>	-
1a-68	H	-

표 1a (계속)



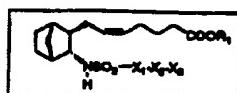
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1a-46	CH <sub>3</sub>	
1a-47	H	-
1a-48	H	-
1a-49	CH <sub>3</sub>	-
1a-50	H	-
1a-51	CH <sub>3</sub>	-
1a-52	H	-
1a-53	CH <sub>3</sub>	-
1a-54	H	-
1a-55	CH <sub>3</sub>	-
1a-56	H	-
1a-57	CH <sub>3</sub>	-
1a-58	H	-
1a-59	CH <sub>3</sub>	-
1a-60	H	-
1a-61	CH <sub>3</sub>	-
1a-62	H	-
1a-63	CH <sub>3</sub>	-
1a-64	H	-
1a-65	CH <sub>3</sub>	-
1a-66	H	-
1a-67	CH <sub>3</sub>	-
1a-68	H	-
1a-69	CH <sub>3</sub>	-
1a-70	H	-
1a-71	CH <sub>3</sub>	-
1a-72	H	-
1a-73	CH <sub>3</sub>	-
1a-74	H	-
1a-75	CH <sub>3</sub>	-
1a-76	H	-
1a-77	CH <sub>3</sub>	-
1a-78	H	-
1a-79	CH <sub>3</sub>	-
1a-80	H	-
1a-81	CH <sub>3</sub>	-
1a-82	H	-
1a-83	CH <sub>3</sub>	-
1a-84	H	-
1a-85	CH <sub>3</sub>	-
1a-86	H	-
1a-87	CH <sub>3</sub>	-
1a-88	H	-
1a-89	CH <sub>3</sub>	-
1a-90	H	-
1a-91	CH <sub>3</sub>	-
1a-92	H	-
1a-93	CH <sub>3</sub>	-
1a-94	H	-
1a-95	CH <sub>3</sub>	-
1a-96	H	-
1a-97	CH <sub>3</sub>	-
1a-98	H	-
1a-99	CH <sub>3</sub>	-
1a-100	H	-

표 1a (계속)



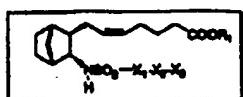
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1a-45	CH <sub>3</sub>	
1a-70	H	
1a-71	CH <sub>3</sub>	
1a-72	H	
1a-73	CH <sub>3</sub>	
1a-74	H	
1a-75	CH <sub>3</sub>	
1a-76	H	
1a-77	CH <sub>3</sub>	
1a-78	H	
1a-79	H	
1a-80	CH <sub>3</sub>	
1a-81	H	
1a-82	CH <sub>3</sub>	
1a-83	H	
1a-84	H	
1a-85	H	
1a-86	H	
1a-87	H	

표 1a (계속)



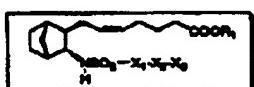
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1a-88	CH <sub>3</sub>	
1a-89	H	
1a-90	CH <sub>3</sub>	
1a-91	H	
1a-92	CH <sub>3</sub>	
1a-93	H	
1a-94	H	
1a-95	H	
1a-96	H	
1a-97	H	
1a-98	H	
1a-99	H	

표 1a (계속)



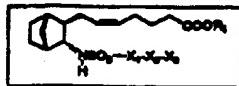
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1a-100	CH <sub>3</sub>	
1a-101	H	
1a-102	CH <sub>3</sub>	
1a-103	CH <sub>3</sub>	
1a-104	H	
1a-105	CH <sub>3</sub>	
1a-106	H	
1a-107	CH <sub>3</sub>	
1a-108	H	
1a-109	CH <sub>3</sub>	
1a-110	H	
1a-111	CH <sub>3</sub>	
1a-112	H	
1a-113	CH <sub>3</sub>	
1a-114	H	

표 1a (계속)



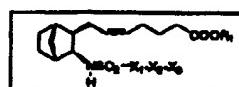
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1a-115	CH <sub>3</sub>	
1a-116	H	
1a-117	NH	
1a-118	Ar	
1a-119	CH <sub>3</sub>	
1a-120	NH	
1a-121	H	
1a-122	CH <sub>3</sub>	
1a-123	H	
1a-124	CH <sub>3</sub>	
1a-125	CH <sub>3</sub>	
1a-126	H	
1a-127	CH <sub>3</sub>	
1a-128	H	
1a-129	CH <sub>3</sub>	
1a-130	CH <sub>3</sub>	
1a-131	H	
1a-132	CH <sub>3</sub>	
1a-133	H	
1a-134	H	
1a-135	CH <sub>3</sub>	
1a-136	H	
1a-137	CH <sub>3</sub>	
1a-138	H	
1a-139	CH <sub>3</sub>	
1a-140	H	

표 1a (계속)



No.	R<sub>1</sub>	X<sub>1</sub>-X<sub>2</sub>-X<sub>3</sub>
1a-141	CH<sub>3</sub>	-CH<sub>2</sub>-Phenyl-Phenyl-NH-
1a-142	H	-Phenyl-Phenyl-O-
1a-143	H	-Phenyl-Phenyl-NH<sub>2</sub>-
1a-144	H	-Phenyl-Phenyl-NH<sub>2</sub>-
1a-145	H	-Phenyl-Phenyl-CH<sub>3</sub>-
1a-146	H	-Phenyl-Phenyl-C(=O)N<sub>2</sub>-
1a-147	H	-Phenyl-Phenyl-C(=O)NH<sub>2</sub>-
1a-148	H	-Phenyl-Phenyl-C(=O)NH<sub>2</sub>-C(=O)NH<sub>2</sub>-
1a-149	H	-Phenyl-Phenyl-C(=O)NH<sub>2</sub>-C(=O)NH<sub>2</sub>-C(=O)NH<sub>2</sub>-
1a-150	H	-Phenyl-Phenyl-OH-C(=O)NH<sub>2</sub>-C(=O)NH<sub>2</sub>-C(=O)NH<sub>2</sub>-
1a-151	H	-Phenyl-Phenyl-OH-C(=O)NH<sub>2</sub>-C(=O)NH<sub>2</sub>-C(=O)NH<sub>2</sub>-C(=O)NH<sub>2</sub>-

표 1a (계속)



No.	R<sub>1</sub>	X<sub>1</sub>-X<sub>2</sub>-X<sub>3</sub>
1a-152	H	-Phenyl-Phenyl-O-
1a-153	H	-Phenyl-Phenyl-O-CH<sub>2</sub>-
1a-154	H	-Phenyl-Phenyl-O-CH<sub>2</sub>-CH<sub>2</sub>-
1a-155	H	-Phenyl-Phenyl-O-
1a-156	H	-Phenyl-Phenyl-O-
1a-157	H	-Phenyl-Phenyl-O-
1a-158	H	-Phenyl-Phenyl-O-
1a-159	H	-Phenyl-Phenyl-O-CH<sub>3</sub>-
1a-160	H	-Phenyl-Phenyl-O-NH-

표 1a (계속)

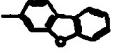
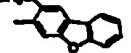
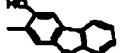
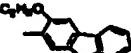
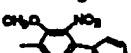
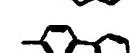
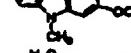
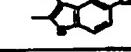
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1a-161	H	
1a-162	H	
1a-163	H	
1a-164	H	
1a-165	H	
1a-166	H	
1a-167	H	
1a-168	H	
1a-169	H	
1a-170	H	
1a-171	CH <sub>3</sub>	
1a-172	H	

표 1a (계속)

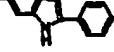
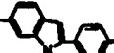
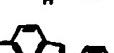
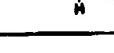
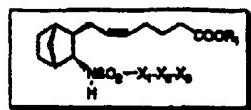
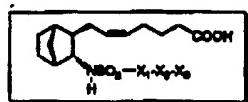
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1a-173	H	
1a-174	H	
1a-175	CH <sub>3</sub>	
1a-176	H	
1a-177	CH <sub>3</sub>	
1a-178	H	
1a-179	CH <sub>3</sub>	
1a-180	H	
1a-181	H	
1a-182	CH <sub>3</sub>	
1a-183	H	

표 1a (계속)



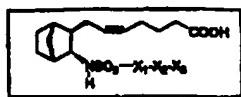
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1a-184	H	
1a-185	H	
1a-186	CH <sub>3</sub>	
1a-187	H	
1a-188	CH <sub>3</sub>	
1a-189	H	
1a-190	CH <sub>3</sub>	
1a-191	H	
1a-192	CH <sub>3</sub>	
1a-193	H	

표 1a (계속)



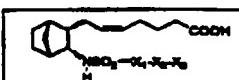
No.	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1a-194	
1a-195	
1a-196	
1a-197	
1a-198	
1a-199	
1a-200	
1a-201	
1a-202	
1a-203	

표 1a (계속)



No.	$X_1-X_2-X_3$
1a-204	
1a-205	
1a-206	
1a-207	
1a-208	
1a-209	
1a-210	
1a-211	
1a-212	
1a-213	

표 1a (계속)



No.	$X_1-X_2-X_3$
1a-214	
1a-215	
1a-216	
1a-217	
1a-218	
1a-219	
1a-220	
1a-221	
1a-222	
1a-223	

표 1a (계속)

No.	$X_1-X_2-X_3$
1a-224	
1a-225	
1a-226	
1a-227	
1a-228	
1a-229	
1a-230	
1a-231	
1a-232	
1a-233	
1a-234	
1a-235	

표 1a (계속)

No.	$X_1-X_2-X_3$
1a-236	
1a-237	
1a-238	
1a-239	
1a-240	
1a-241	
1a-242	
1a-243	
1a-244	
1a-245	
1a-246	

표 1a (계속)

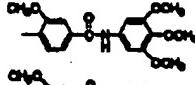
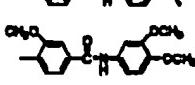
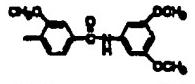
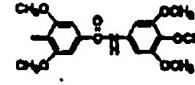
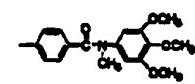
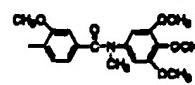
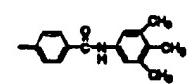
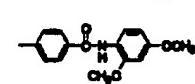
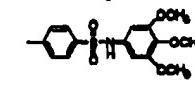
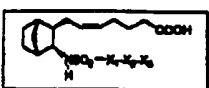
No.	$X_1, X_2, X_3$
1a-247	
1a-248	
1a-249	
1a-250	
1a-251	
1a-252	
1a-253	
1a-254	
1a-255	
1a-256	
1a-257	

표 1a (계속)



No.	$X_1-X_2-X_3$
1a-369	-
1a-370	-
1a-371	-
1a-372	-
1a-373	-
1a-374	-
1a-375	-
1a-376	-
1a-377	-
1a-378	-
1a-379	-
1a-380	-
1a-381	-
1a-382	-
1a-383	-
1a-384	-
1a-385	-
1a-386	-
1a-387	-
1a-388	-
1a-389	-
1a-390	-
1a-391	-
1a-392	-
1a-393	-
1a-394	-
1a-395	-
1a-396	-
1a-397	-
1a-398	-
1a-399	-
1a-400	-
1a-401	-
1a-402	-
1a-403	-
1a-404	-
1a-405	-
1a-406	-
1a-407	-
1a-408	-
1a-409	-
1a-410	-
1a-411	-
1a-412	-
1a-413	-
1a-414	-
1a-415	-
1a-416	-
1a-417	-
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1a-420	-
1a-421	-
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1a-429	-
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1a-561	-
1a-562	-
1a-563	-
1a-564	-
1a-565	-
1a-566	-
1a-567	-
1a-568	-
1a-569	-
1a-570	-
1a-571	-

표 1a (계속)



No.	$X_1-X_2-X_3$
1a-572	-
1a-573	-
1a-574	-
1a-575	-
1a-576	-
1a-577	-
1a-578	-
1a-579	-
1a-580	-
1a-581	-
1a-582	-
1a-583	-
1a-584	-
1a-585	-
1a-586	-
1a-587	-
1a-588	-
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1a-592	-
1a-593	-
1a-594	-
1a-595	-
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1a-597	-
1a-598	-
1a-599	-
1a-600	-
1a-601	-
1a-602	-
1a-603	-
1a-604	-
1a-605	-
1a-606	-
1a-607	-
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1a-615	-
1a-616	-
1a-617	-
1a-618	-
1a-619	-
1a-620	-
1a-621	-
1a-622	-
1a-623	-
1a-624	-
1a-625	-
1a-626	-
1a-627	-
1a-628	-
1a-629	-
1a-630	-
1a-631	-

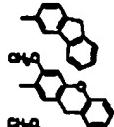
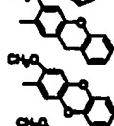
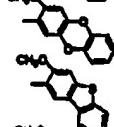
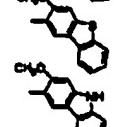
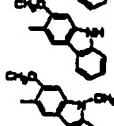
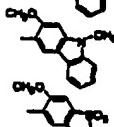
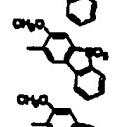
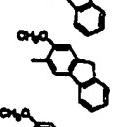
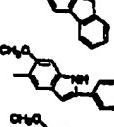
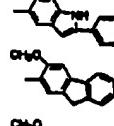
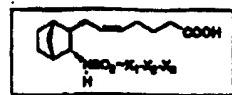
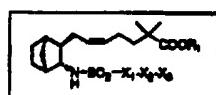
No.	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1a-294	
1a-295	
1a-296	
1a-297	
1a-298	
1a-299	
1a-300	
1a-301	
1a-302	
1a-303	
1a-304	

표 1a (계속)



No.	$X_1-X_2-X_3$
1a-293	
1a-294	
1a-297	
1a-298	
1a-299	
1a-300	
1a-301	
1a-302	
1a-303	
1a-304	
1a-305	

图 1b

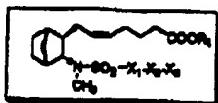


No.	$X_1$	$X_1-X_2-X_3$
1b-1	CH <sub>3</sub>	
1b-3	CH <sub>3</sub>	
1b-5	H	
1b-4	H	
1b-6	H	
1b-8	H	
1b-7	H	
1b-9	H	
1b-10	H	

표 1b (계속)

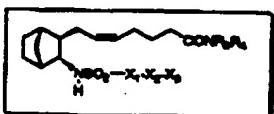
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1b-11	H	
1b-12	H	
1b-13	H	
1b-14	H	
1b-15	H	

표 1c



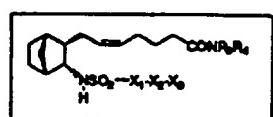
No.	$R_1$	$X_1X_2X_3$
1e-1	$\text{CH}_3$	
1e-2	$\text{CH}_3$	
1e-3	H	
1e-4	H	
1e-5	H	
1e-6	H	
1e-7	H	
1e-8	H	
1e-9	H	
1e-10	H	
1e-11	H	
1e-12	H	

图 1d



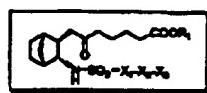
No.	R <sub>2</sub> - R <sub>4</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1d-1	H SO <sub>2</sub> CH <sub>3</sub>	
1d-2	H H	
1d-3	H OH	
1d-4	H SO <sub>2</sub> CH <sub>3</sub>	
1d-5	H SO <sub>2</sub> CH <sub>3</sub>	
1d-6	H SO <sub>2</sub> CH <sub>3</sub>	
1d-7	H SO <sub>2</sub> CH <sub>3</sub>	
1d-8	H SO <sub>2</sub> CH <sub>3</sub>	
1d-9	H SO <sub>2</sub> CH <sub>3</sub>	
1d-10	H SO <sub>2</sub> CH <sub>3</sub>	

표 1d (계속)



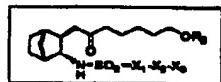
No.	R <sub>2</sub>	R <sub>4</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1e-11	H	SO <sub>2</sub> CH <sub>3</sub>	
1e-12	H	SO <sub>2</sub> CH <sub>3</sub>	
1e-13	H	SO <sub>2</sub> CH <sub>3</sub>	
1e-14	H	SO <sub>2</sub> CH <sub>3</sub>	
1e-15	H	SO <sub>2</sub> CH <sub>3</sub>	

표 1e



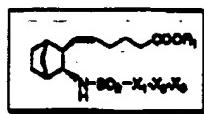
No.	$R_2$	$X_1-X_2-X_3$
1e-1	H	
1e-2	H	
1e-3	H	
1e-4	H	
1e-5	H	
1e-6	H	
1e-7	H	
1e-8	H	
1e-9	H	
1e-10	H	

图 1f



No.	$R_2$	$X_1-X_2-X_3$
1f-1	H	
1f-2	H	
1f-3	H	
1f-4	H	
1f-5	H	
1f-6	H	
1f-7	H	
1f-8	H	
1f-9	H	
1f-10	H	

图 1g



No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1g-1	H	
1g-2	H	
1g-3	H	
1g-4	H	
1g-5	H	
1g-6	H	
1g-7	H	
1g-8	H	
1g-9	H	
1g-10	H	
1g-11	H	

图 1h

No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1b-1	H	
1b-2	H	
1b-3	H	
1b-4	H	
1b-5	H	
1b-6	H	
1b-7	H	
1b-8	H	
1b-9	H	
1b-10	H	

图 1i

No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1b-1	H	
1b-2	H	
1b-3	H	
1b-4	H	
1b-5	H	
1b-6	H	
1b-7	H	
1b-8	H	
1b-9	H	
1b-10	H	

표 1j

No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1j-1	CH <sub>3</sub>	
1j-2	H	
1j-3	Na	
1j-4	H	
1j-5	CH <sub>3</sub>	
1j-6	CH <sub>3</sub>	
1j-7	H	
1j-8	CH <sub>3</sub>	
1j-9	CH <sub>3</sub>	
1j-10	H	
1j-11	CH <sub>3</sub>	
1j-12	H	
1j-13	CH <sub>3</sub>	
1j-14	H	
1j-15	CH <sub>3</sub>	
1j-16	H	

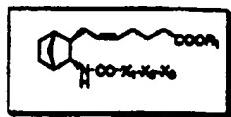
표 1j(계속)

No.	$R_1$	$X_1-X_2-X_3$
IJ-17	H	
IJ-18	$\text{CH}_3$	
IJ-19	H	
IJ-20	$\text{CH}_3$	
IJ-21	H	
IJ-22	H	
IJ-23	$\text{CH}_3$	
IJ-24	H	
IJ-25	$\text{CH}_3$	
IJ-26	H	
IJ-27	H	
IJ-28	$\text{CH}_3$	
IJ-29	H	

표 1j(계속)

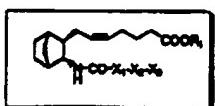
No.	$R_1$	$X_1-X_2-X_3$
IJ-30	H	
IJ-31	H	
IJ-32	H	
IJ-33	H	
IJ-34	H	
IJ-35	H	
IJ-36	H	
IJ-37	H	
IJ-38	H	

표 1k



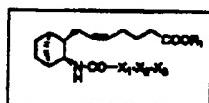
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1b-1	H	-O-CH <sub>2</sub> -C <sub>6</sub> H <sub>5</sub>
1b-2	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -NH-C <sub>6</sub> H <sub>5</sub>
1b-3	H	-C <sub>6</sub> H <sub>4</sub> -Biphenyl
1b-4	H	-C <sub>6</sub> H <sub>4</sub> -Phenyl
1b-5	H	-C <sub>6</sub> H <sub>4</sub>
1b-6	H	-Phenyl
1b-7	H	-C <sub>6</sub> H <sub>4</sub> -O-Phenyl
1b-8	H	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -OH
1b-9	H	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -OAc
1b-10	H	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -OCH <sub>3</sub>
1b-11	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -Biphenyl
1b-12	H	-C <sub>6</sub> H <sub>4</sub> -Phenyl

표 1k (계속)



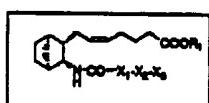
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1b-13	H	-C <sub>6</sub> H <sub>4</sub> -N=N-C <sub>6</sub> H <sub>4</sub> -OCH <sub>3</sub>
1b-14	H	-C <sub>6</sub> H <sub>4</sub> -Biphenyl
1b-15	H	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub>
1b-16	H	-C <sub>6</sub> H <sub>4</sub> -O-Dibenzo-furan
1b-17	H	-C <sub>6</sub> H <sub>4</sub> -O-Dibenzo-pyran
1b-18	H	-C <sub>6</sub> H <sub>4</sub> -CH <sub>2</sub> -Phenyl
1b-19	H	-C <sub>6</sub> H <sub>4</sub> -C(=O)-NH-C <sub>6</sub> H <sub>4</sub> -C(=O)-CO <sub>2</sub> CH <sub>3</sub>
1b-20	H	-C <sub>6</sub> H <sub>4</sub> -Biphenyl

표 1m



No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1m-1	CH <sub>3</sub>	
1m-2	H	-C <sub>6</sub> H <sub>4</sub> -C <sub>6</sub> H <sub>4</sub> -
1m-3	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -C <sub>6</sub> H <sub>4</sub> -
1m-4	H	-C <sub>6</sub> H <sub>4</sub> -C <sub>6</sub> H <sub>4</sub> -
1m-5	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -NH-C <sub>6</sub> H <sub>4</sub> -
1m-6	H	-C <sub>6</sub> H <sub>4</sub> -NH-C <sub>6</sub> H <sub>4</sub> -
1m-7	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -
1m-8	H	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -
1m-9	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -OAc
1m-10	H	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -OAc
1m-11	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -OH
1m-12	H	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -OH
1m-13	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -OC <sub>6</sub> H <sub>5</sub>
1m-14	H	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -OC <sub>6</sub> H <sub>5</sub>
1m-15	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -C <sub>6</sub> H <sub>4</sub> -OAc
1m-16	H	-C <sub>6</sub> H <sub>4</sub> -C <sub>6</sub> H <sub>4</sub> -OAc
1m-17	CH <sub>3</sub>	
1m-18	H	-C <sub>6</sub> H <sub>4</sub> -C <sub>6</sub> H <sub>4</sub> -OH

표 1m (계속)



No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1m-19	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -C <sub>6</sub> H <sub>4</sub> -COCH <sub>3</sub>
1m-20	H	-C <sub>6</sub> H <sub>4</sub> -C <sub>6</sub> H <sub>4</sub> -COCH <sub>3</sub>
1m-21	H	-C <sub>6</sub> H <sub>4</sub> -
1m-22	H	-C <sub>6</sub> H <sub>4</sub> -C <sub>6</sub> H <sub>4</sub> -
1m-23	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -
1m-24	H	-C <sub>6</sub> H <sub>4</sub> -
1m-25	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -OAc
1m-26	H	-C <sub>6</sub> H <sub>4</sub> -OAc
1m-27	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -OH
1m-28	H	-C <sub>6</sub> H <sub>4</sub> -OH
1m-29	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -OC <sub>6</sub> H <sub>5</sub>
1m-30	H	-C <sub>6</sub> H <sub>4</sub> -OC <sub>6</sub> H <sub>5</sub>
1m-31	H	-C <sub>6</sub> H <sub>4</sub> -C(=O)-NH-C <sub>6</sub> H <sub>4</sub> -
1m-32	H	-C <sub>6</sub> H <sub>4</sub> -C(=O)-NH-C <sub>6</sub> H <sub>4</sub> -
1m-33	H	-C <sub>6</sub> H <sub>4</sub> -C(=O)-NH-C <sub>6</sub> H <sub>4</sub> -

표 1m (계속)

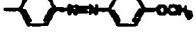
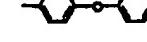
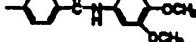
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
1m-34	H	
1m-35	H	
1m-36	H	
1m-37	H	
1m-38	H	
1m-39	H	
1m-40	H	

표 2a

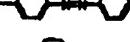
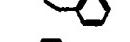
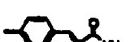
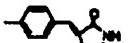
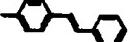
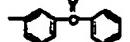
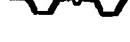
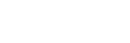
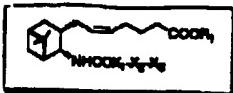
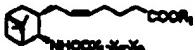
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2a-1	CH <sub>3</sub>	
2a-2	H	
2a-3	CH <sub>3</sub>	
2a-4	H	
2a-5	H	
2a-6	CH <sub>3</sub>	
2a-7	H	
2a-8	CH <sub>3</sub>	
2a-9	H	
2a-10	CH <sub>3</sub>	
2a-11	H	
2a-12	CH <sub>3</sub>	
2a-13	H	
2a-14	CH <sub>3</sub>	
2a-15	H	
2a-16	CH <sub>3</sub>	
2a-17	H	
2a-18	CH <sub>3</sub>	
2a-19	H	
2a-20	CH <sub>3</sub>	
2a-21	H	
2a-22	CH <sub>3</sub>	
2a-23	H	
2a-24	CH <sub>3</sub>	

표 2a (계속)



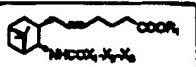
No.	$R_1$	$X_1-X_2-X_3$
2a-23	CH <sub>3</sub>	-O-C <sub>6</sub> H <sub>4</sub> -C <sub>6</sub> H <sub>4</sub> -O-
2a-26	H	-O-C <sub>6</sub> H <sub>4</sub> -C <sub>6</sub> H <sub>4</sub> -O-
2a-27	CH <sub>3</sub>	-O-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -O-
2a-28	H	-O-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -O-
2a-29	CH <sub>3</sub>	-O-C <sub>6</sub> H <sub>4</sub> -N=O-C <sub>6</sub> H <sub>4</sub> -O-
2a-30	H	-O-C <sub>6</sub> H <sub>4</sub> -N=O-C <sub>6</sub> H <sub>4</sub> -O-
2a-31	CH <sub>3</sub>	-O-C <sub>6</sub> H <sub>4</sub> -N=N-C <sub>6</sub> H <sub>4</sub> -O-
2a-32	CH <sub>3</sub>	-O-C <sub>6</sub> H <sub>4</sub> -CH <sub>2</sub> -N=N-
2a-33	H	-O-C <sub>6</sub> H <sub>4</sub> -CH <sub>2</sub> -N=N-
2a-34	CH <sub>3</sub>	-O-C <sub>6</sub> H <sub>4</sub> -C≡N-C <sub>6</sub> H <sub>4</sub> -O-
2a-35	H	-O-C <sub>6</sub> H <sub>4</sub> -C≡N-C <sub>6</sub> H <sub>4</sub> -O-
2a-36	CH <sub>3</sub>	-O-C <sub>6</sub> H <sub>4</sub> -N=C <sub>6</sub> H <sub>4</sub> -O-
2a-37	H	-O-C <sub>6</sub> H <sub>4</sub> -N=C <sub>6</sub> H <sub>4</sub> -O-
2a-38	CH <sub>3</sub>	-O-C <sub>6</sub> H <sub>4</sub> -N=C <sub>6</sub> H <sub>4</sub> -N-CH <sub>3</sub>
2a-39	H	-O-C <sub>6</sub> H <sub>4</sub> -N=C <sub>6</sub> H <sub>4</sub> -N-CH <sub>3</sub>
2a-40	CH <sub>3</sub>	-O-C <sub>6</sub> H <sub>4</sub> -N=C <sub>6</sub> H <sub>4</sub> -C(=O)NH <sub>2</sub>
2a-41	H	-O-C <sub>6</sub> H <sub>4</sub> -N=C <sub>6</sub> H <sub>4</sub> -C(=O)NH <sub>2</sub>
2a-42	CH <sub>3</sub>	-O-C <sub>6</sub> H <sub>4</sub> -N=C <sub>6</sub> H <sub>4</sub> -C(=O)NH <sub>2</sub>
2a-43	H	-O-C <sub>6</sub> H <sub>4</sub> -N=C <sub>6</sub> H <sub>4</sub> -C(=O)NH <sub>2</sub>
2a-44	CH <sub>3</sub>	-O-C <sub>6</sub> H <sub>4</sub> -N=C <sub>6</sub> H <sub>4</sub> -C(=O)NH-C <sub>6</sub> H <sub>5</sub>
2a-45	H	-O-C <sub>6</sub> H <sub>4</sub> -N=C <sub>6</sub> H <sub>4</sub> -C(=O)NH-C <sub>6</sub> H <sub>5</sub>
2a-46	CH <sub>3</sub>	-O-C <sub>6</sub> H <sub>4</sub> -N=C <sub>6</sub> H <sub>4</sub> -C(=O)NH-C <sub>6</sub> H <sub>5</sub>
2a-47	H	-O-C <sub>6</sub> H <sub>4</sub> -N=C <sub>6</sub> H <sub>4</sub> -C(=O)NH-C <sub>6</sub> H <sub>5</sub>

표 2a (계속)



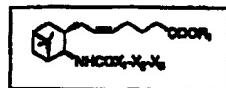
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2a-48	CH <sub>3</sub>	
2a-49	H	
2a-50	CH <sub>3</sub>	
2a-51	H	
2a-52	CH <sub>3</sub>	
2a-53	H	
2a-54	CH <sub>3</sub>	
2a-55	H	
2a-56	CH <sub>3</sub>	
2a-57	H	
2a-58	CH <sub>3</sub>	
2a-59	H	
2a-60	CH <sub>3</sub>	
2a-61	H	
2a-62	CH <sub>3</sub>	
2a-63	H	
2a-64	CH <sub>3</sub>	
2a-65	H	
2a-66	CH <sub>3</sub>	
2a-67	H	

표 2a (계속)



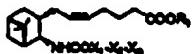
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2a-68	CH <sub>3</sub>	
2a-69	H	
2a-70	CH <sub>3</sub>	
2a-71	H	
2a-72	CH <sub>3</sub>	
2a-73	H	
2a-74	CH <sub>3</sub>	
2a-75	H	
2a-76	CH <sub>3</sub>	
2a-77	H	
2a-78	CH <sub>3</sub>	
2a-79	H	
2a-80	CH <sub>3</sub>	
2a-81	H	
2a-82	CH <sub>3</sub>	
2a-83	H	
2a-84	CH <sub>3</sub>	
2a-85	H	
2a-86	CH <sub>3</sub>	
2a-87	H	

표 2a (계속)



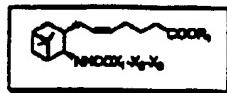
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2a-88	CH <sub>3</sub>	
2a-89	H	
2a-90	CH <sub>3</sub>	
2a-91	H	
2a-92	CH <sub>3</sub>	
2a-93	H	
2a-94	CH <sub>3</sub>	
2a-95	H	
2a-96	Na	
2a-97	Ca <sup>18</sup>	
2a-98	CH <sub>3</sub>	
2a-99	H	
2a-100	CH <sub>3</sub>	
2a-101	H	
2a-102	CH <sub>3</sub>	
2a-103	H	
2a-104	CH <sub>3</sub>	
2a-105	H	
2a-106	CH <sub>3</sub>	
2a-107	H	
2a-108	CH <sub>3</sub>	
2a-109	H	
2a-110	Na	
2a-111	CH <sub>3</sub>	
2a-112	H	

표 2a (계속)



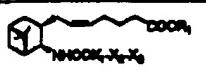
No.	$R_1$	$X_1-X_2-X_3$
2a-113	CH <sub>3</sub>	-
2a-114	H	-C <sub>6</sub> H <sub>4</sub> -OCH <sub>3</sub>
2a-115	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -CH <sub>3</sub>
2a-116	H	-C <sub>6</sub> H <sub>4</sub> -CH <sub>3</sub>
2a-117	CH <sub>3</sub>	-C <sub>6</sub> H <sub>4</sub> -CH <sub>2</sub> O
2a-118	H	-C <sub>6</sub> H <sub>4</sub> -CH <sub>2</sub> O
2a-119	H	-C <sub>6</sub> H <sub>4</sub> -COOH
2a-120	H	-C <sub>6</sub> H <sub>4</sub> -OH
2a-121	H	-C <sub>6</sub> H <sub>4</sub> -OC <sub>2</sub> H <sub>5</sub>
2a-122	H	-C <sub>6</sub> H <sub>5</sub>
2a-123	H	-CH <sub>2</sub> -C <sub>6</sub> H <sub>5</sub>
2a-124	H	-CH <sub>2</sub> -C <sub>6</sub> H <sub>4</sub> -OH
2a-125	H	-C <sub>6</sub> H <sub>4</sub> -C(=O)-C <sub>6</sub> H <sub>5</sub>

표 2a (계속)



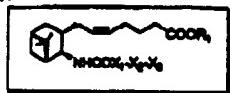
No.	$\text{R}_1$	$\text{X}_1\text{-X}_2\text{-X}_3$
2a-126	H	
2a-127	H	
2a-128	H	
2a-129	H	
2a-130	H	
2a-131	H	
2a-132	H	
2a-133	H	
2a-134	H	
2a-125	H	
2a-126	H	

표 2a (계속)



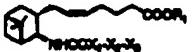
No.	R <sub>1</sub>	X <sub>1</sub> X <sub>2</sub> X <sub>3</sub>
2a-137	H	-O-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -OC <sub>2</sub> H <sub>5</sub>
2a-138	H	-O-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -OC(=O)CH <sub>2</sub> CH <sub>3</sub>
2a-139	H	
2a-140	H	
2a-141	H	-O-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -CO <sub>2</sub> H
2a-142	H	
2a-143	H	
2a-144	H	
2a-145	H	
2a-146	H	
2a-147	H	

표 2a (계속)



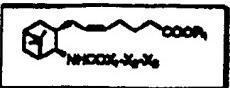
No.	-R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2a-148	H	-O-C <sub>6</sub> H <sub>4</sub> -C <sub>6</sub> H <sub>4</sub> -O-
2a-149	H	-O-C <sub>6</sub> H <sub>4</sub> -O-
2a-150	H	-O-C <sub>6</sub> H <sub>2</sub> (F)-O-
2a-151	H	-O-C <sub>6</sub> H <sub>2</sub> (Cl)-O-
2a-152	H	-O-C <sub>6</sub> H <sub>2</sub> (NO <sub>2</sub> )-O-
2a-153	H	-O-C <sub>6</sub> H <sub>2</sub> (OMe)-O-
2a-154	H	-O-C <sub>6</sub> H <sub>2</sub> (CH <sub>3</sub> )-O-
2a-155	H	-O-C <sub>6</sub> H <sub>3</sub> (OMe) <sub>2</sub> -O-
2a-156	H	-O-C <sub>6</sub> H <sub>3</sub> (OMe) <sub>2</sub> -N-
2a-157	H	-O-C <sub>6</sub> H <sub>2</sub> (NO <sub>2</sub> ) <sub>2</sub> -N-
2a-158	H	-O-C <sub>6</sub> H <sub>2</sub> (NO <sub>2</sub> ) <sub>2</sub> -O-
2a-159	H	-O-C <sub>6</sub> H <sub>2</sub> (NO <sub>2</sub> ) <sub>2</sub> -O-

표 2a (계속)



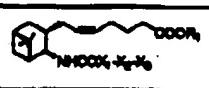
No.	-R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2a-160	H	
2a-161	H	
2a-162	H	
2a-163	H	
2a-164	H	
2a-165	H	
2a-166	H	
2a-167	H	
2a-168	H	
2a-169	H	
2a-170	H	

표 2a (계속)



No.	$\text{R}_1$	$\text{X}_1\text{-}\text{X}_2\text{-}\text{X}_3$
2a-171	H	
2a-172	H	
2a-173	H	
2a-174	H	
2a-175	H	
2a-176	H	
2a-177	H	
2a-178	H	
2a-179	H	
2a-180	H	
2a-181	H	
2a-182	H	

표 2a (계속)

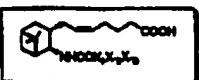


No.	- R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2a-123	H	
2a-124	H	
2a-125	H	
2a-126	H	
2a-127	H	
2a-128	H	
2a-129	H	
2a-130	H	
2a-131	H	
2a-132	H	
2a-133	H	

표 2a (계속)

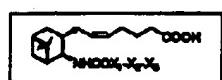
No.	R <sub>1</sub>	X <sub>1</sub> X <sub>2</sub> X <sub>3</sub>
2a-194	H	
2a-195	H	
2a-196	H	
2a-197	H	
2a-198	H	
2a-199	H	
2a-200	H	
2a-201	H	
2a-202	H	
2a-203	H	

표 2a (계속)



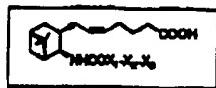
No.	$X_1-X_2-X_3$
2a-204	
2a-205	
2a-206	
2a-207	
2a-208	
2a-209	
2a-210	
2a-211	
2a-212	
2a-213	

표 2a (계속)



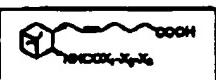
No.	$X_1-X_2-X_3$
2a-214	
2a-215	
2a-216	
2a-217	
2a-218	
2a-219	
2a-220	
2a-221	
2a-222	
2a-223	

표 2a (계속)



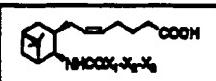
No.	$X_1, X_2, X_3$
2a-224	
2a-225	
2a-226	
2a-227	
2a-228	
2a-229	
2a-230	
2a-231	
2a-232	
2a-233	

표 2a (계속)



No.	$X_1-X_2-X_3$
2a-334	
2a-335	
2a-336	
2a-337	
2a-338	
2a-339	
2a-340	
2a-341	
2a-342	
2a-343	

표 2a (계속)



No.	$X_1-X_2-X_3$
2a-344	
2a-345	
2a-346	
2a-347	
2a-348	
2a-349	
2a-350	
2a-351	

표 2a (계속)

No.	$X_1-X_2-X_3$
2a-252	
2a-253	
2a-254	
2a-255	
2a-256	
2a-257	

표 2a (계속)

No.	$X_1-X_2-X_3$
2a-258	
2a-259	
2a-260	
2a-261	
2a-262	
2a-263	
2a-264	
2a-265	
2a-266	
2a-267	

표 2a (계속)

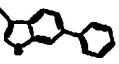
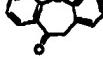
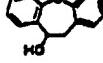
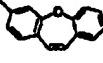
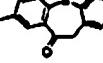
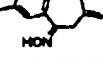
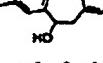
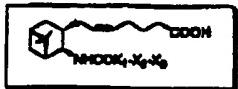
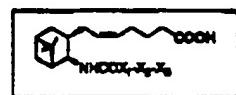
No.	$X_1-X_2-X_3$
2a-368	
2a-369	
2a-370	
2a-371	
2a-372	
2a-373	
2a-374	
2a-375	
2a-376	
2a-377	

표 2a (계속)



No.	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2a-278	
2a-279	
2a-280	
2a-281	
2a-282	
2a-283	
2a-284	
2a-285	
2a-286	
2a-287	

표 2a (계속)



No.	$\text{X}_1-\text{X}_2-\text{X}_3$
2a-292	
2a-293	
2a-294	
2a-295	
2a-296	

표 2a (계속)

No.	$X_1-X_2-X_3$
2a-397	
2a-398	
2a-399	
2a-400	
2a-391	
2a-392	
2a-393	
2a-394	
2a-395	
2a-396	

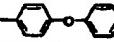
표 2a (계속)

No.	$X_1-X_2-X_3$
2a-397	
2a-398	
2a-399	
2a-410	
2a-411	
2a-412	
2a-413	
2a-414	
2a-415	

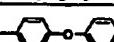
H 2b

No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2b-1	H	
2b-2	H	

H 2c

No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2c-1	H	
2c-2	H	
2c-3	H	

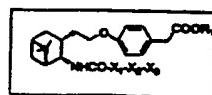
H 2d

No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2d-1	H	
2d-2	H	
2d-3	H	

H 2e

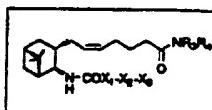
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2e-1	H	
2e-2	H	
2e-3	H	

H 2f



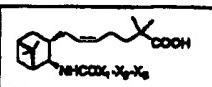
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2f-1	H	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -
2f-2	H	-C <sub>6</sub> H <sub>4</sub> -
2f-3	H	-C <sub>6</sub> H <sub>3</sub> (S)-

图 2g



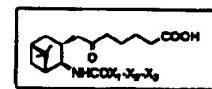
No.	R <sub>2</sub>	R <sub>3</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2g-1	H	SO <sub>2</sub> CH <sub>3</sub>	-C <sub>6</sub> H <sub>3</sub> (S)-

图 2h



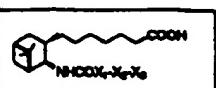
No.	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2h-1	-C <sub>6</sub> H <sub>3</sub> (S)-
2h-2	-C <sub>6</sub> H <sub>2</sub> (OCH <sub>3</sub> ) <sub>2</sub> -
2h-3	-C <sub>6</sub> H <sub>2</sub> (OC <sub>6</sub> H <sub>5</sub> ) <sub>2</sub> -
2h-4	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -
2h-5	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>5</sub> -
2h-6	-C <sub>6</sub> H <sub>2</sub> (OC <sub>6</sub> H <sub>5</sub> ) <sub>2</sub> -

图 2i



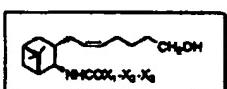
No.	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
2i-1	-C <sub>6</sub> H <sub>3</sub> (S)-
2i-2	-C <sub>6</sub> H <sub>2</sub> (OCH <sub>3</sub> ) <sub>2</sub> -
2i-3	-C <sub>6</sub> H <sub>2</sub> (OC <sub>6</sub> H <sub>5</sub> ) <sub>2</sub> -
2i-4	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>4</sub> -
2i-5	-C <sub>6</sub> H <sub>4</sub> -O-C <sub>6</sub> H <sub>5</sub> -
2i-6	-C <sub>6</sub> H <sub>2</sub> (OC <sub>6</sub> H <sub>5</sub> ) <sub>2</sub> -

图 2j



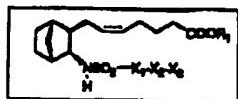
No.	$\text{X}_1\text{X}_2\text{X}_3$
2a-1	
2a-2	
2a-3	
2a-4	
2a-5	
2a-6	

图 2k



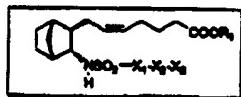
No.	$\text{X}_1\text{X}_2\text{X}_3$
2b-1	
2b-2	
2b-3	
2b-4	
2b-5	
2b-6	

图 3a



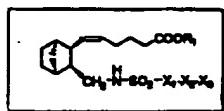
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
3a-1	CH <sub>3</sub>	
3a-2	H	
3a-3	CH <sub>3</sub>	
3a-4	H <sub>3</sub> N <sup>+</sup> C(CH <sub>3</sub> ) <sub>2</sub> CH <sub>2</sub>	
3a-5	Na	
3a-6	Li Cu	
3a-7		
3a-8	H	
3a-9	H	
3a-10	CH <sub>3</sub>	
3a-11	H	
3a-12	CH <sub>3</sub>	
3a-13	H	
3a-14	CH <sub>3</sub>	
3a-15	CH <sub>3</sub>	
3a-16	H	
3a-17	CH <sub>3</sub>	
3a-18	H	

표 3a (계속)



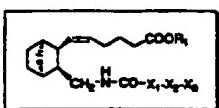
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
3a-19	CH <sub>3</sub>	
3a-20	H	
3a-21	CH <sub>3</sub>	
3a-22	H	
3a-23	CH <sub>3</sub>	
3a-24	H	
3a-25	H	
3a-26	CH <sub>3</sub>	
3a-27	H	
3a-28	CH <sub>3</sub>	
3a-29	H	
3a-30	CH <sub>3</sub>	
3a-31	CH <sub>3</sub>	
3a-32	H	
3a-33	Na	
3a-34	H	
3a-35	Na	

표 3b



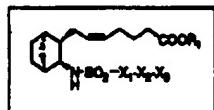
No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
3a-1	CH <sub>3</sub>	
3a-2	H	
3a-3	H	
3a-4	H	

표 3c



No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
3c-1	H	

표 3d



No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
3d-1	1/2 Ce	
3d-2	Na	
3d-3	Na	
3d-4	Na	
3d-5	CH <sub>3</sub>	
3d-6	H	
3d-7	CH <sub>3</sub>	
3d-8	H	
3d-9	Na	
3d-10	CH <sub>3</sub>	
3d-11	H	
3d-12	Na	
3d-13	1/2 Ce	
3d-14	H	
3d-15	Na	

표 3d (계속)

No.	R <sub>1</sub>	X <sub>1</sub> -X <sub>2</sub> -X <sub>3</sub>
34-36	H	
34-37	H	
34-38	H	
34-39	CH <sub>3</sub>	
34-40	H	
34-41	CH <sub>3</sub>	
34-42	H	
34-43	H	
34-44	H	
34-45	H	
34-46	H	
34-47	H	
34-48	H	
34-49	H	
34-50	H	
34-51	H	
34-52	H	
34-53	H	
34-54	H	
34-55	H	
34-56	H	
34-57	H	
34-58	H	
34-59	H	
34-60	H	
34-61	H	
34-62	H	
34-63	H	
34-64	H	
34-65	H	
34-66	H	
34-67	H	
34-68	H	
34-69	H	
34-70	H	
34-71	H	
34-72	H	
34-73	H	
34-74	H	
34-75	H	
34-76	H	
34-77	H	
34-78	H	
34-79	H	
34-80	H	
34-81	H	
34-82	H	
34-83	H	
34-84	H	
34-85	H	
34-86	H	
34-87	H	
34-88	H	
34-89	H	
34-90	H	
34-91	H	
34-92	H	
34-93	H	
34-94	H	
34-95	H	
34-96	H	
34-97	H	
34-98	H	
34-99	H	
34-100	H	
34-101	H	
34-102	H	
34-103	H	
34-104	H	
34-105	H	
34-106	H	
34-107	H	
34-108	H	
34-109	H	
34-110	H	
34-111	H	
34-112	H	
34-113	H	
34-114	H	
34-115	H	
34-116	H	
34-117	H	
34-118	H	
34-119	H	
34-120	H	
34-121	H	
34-122	H	
34-123	H	
34-124	H	
34-125	H	
34-126	H	
34-127	H	
34-128	H	
34-129	H	
34-130	H	
34-131	H	
34-132	H	
34-133	H	
34-134	H	
34-135	H	
34-136	H	
34-137	H	
34-138	H	
34-139	H	
34-140	H	
34-141	H	
34-142	H	
34-143	H	
34-144	H	
34-145	H	
34-146	H	
34-147	H	
34-148	H	
34-149	H	
34-150	H	
34-151	H	
34-152	H	
34-153	H	
34-154	H	
34-155	H	
34-156	H	
34-157	H	
34-158	H	
34-159	H	
34-160	H	
34-161	H	
34-162	H	
34-163	H	
34-164	H	
34-165	H	
34-166	H	
34-167	H	
34-168	H	
34-169	H	
34-170	H	
34-171	H	
34-172	H	
34-173	H	
34-174	H	
34-175	H	
34-176	H	
34-177	H	
34-178	H	
34-179	H	
34-180	H	
34-181	H	
34-182	H	
34-183	H	
34-184	H	
34-185	H	
34-186	H	
34-187	H	
34-188	H	
34-189	H	
34-190	H	
34-191	H	
34-192	H	
34-193	H	
34-194	H	
34-195	H	
34-196	H	
34-197	H	
34-198	H	
34-199	H	
34-200	H	
34-201	H	
34-202	H	
34-203	H	
34-204	H	
34-205	H	
34-206	H	
34-207	H	
34-208	H	
34-209	H	
34-210	H	
34-211	H	
34-212	H	
34-213	H	
34-214	H	
34-215	H	
34-216	H	
34-217	H	
34-218	H	
34-219	H	
34-220	H	
34-221	H	
34-222	H	
34-223	H	
34-224	H	
34-225	H	
34-226	H	
34-227	H	
34-228	H	
34-229	H	
34-230	H	
34-231	H	<img alt="Chemical structure of a benzene ring with a methyl group at position 1 and a carboxylic acid group

No.1a - 4

$[\alpha]_D = -11.5^\circ$  ( $\text{CHCl}_3, c=1.01, 25.0^\circ\text{C}$ ).

No.1a - 5

$[\alpha]_D = -10.0^\circ$  ( $\text{CHCl}_3, c=1.01, 25.0^\circ\text{C}$ ).

No.1a - 6

$\text{CDCl}_3, 300\text{MHz}$

0.93-1.96(14H,m), 2.20-2.26(3H,m), 3.03(1H,m), 3.67(3H,s), 4.99(1H,d,J=6.6Hz)  
m, 5.10-5.24(2H,m), 7.37-7.51(3H,m), 7.54-7.54(3H,m), 7.76-7.88(2H,m), 8.11(1H,m).

IR ( $\text{CHCl}_3$ ): 3384, 3278, 3026, 2952, 2874, 1727, 1436, 1411, 1324, 1155, 1097 /cm.

$[\alpha]_D = -9.0^\circ$  ( $\text{CHCl}_3, c=1.04, 22.0^\circ\text{C}$ ).

No.1a - 7

$\text{CDCl}_3, 300\text{MHz}$

0.93-2.00(14H,m), 2.18(1H,m), 2.28(2H,t,J=7.2Hz), 3.04(1H,m), 3.15-  
5.25(2H,m), 5.28(1H,d,J=6.9Hz), 7.36-7.50(3H,m), 7.54-7.68(3H,m), 7.76-  
7.89(2H,m), 8.12(1H,m) .

IR( $\text{CHCl}_3$ ): 3268, 3028, 2952, 2872, 1708, 1452, 1410, 1324, 1155, 1097 /cm.

$[\alpha]_D = -9.1^\circ$  ( $\text{CHCl}_3, c=1.01, 24.0^\circ\text{C}$ ).

No.1a - 8

$\text{CDCl}_3, 300\text{MHz}$

0.94-1.99(14H,m), 2.21-  
2.29(3H,m), 3.05(1H,m), 3.67(3H,s), 4.99(1H,d,J=6.8Hz), 5.14-  
5.30(3H,m), 7.70-7.75(6H,m), 7.96-8.01(2H,m).

IR( $\text{CHCl}_3$ ): 3378, 3272, 3018, 2946, 2868, 1727, 1616, 1486, 1388, 1324, 1162, 1180,  
1069 /cm.

$[\alpha]_D = +1.6^\circ$  ( $\text{CHCl}_3, c=1.01, 24.0^\circ\text{C}$ ). mp. 117-119°C.

No.1a - 9

$\text{CDCl}_3, 300\text{MHz}$

0.95-2.08(14H,m), 2.19(1H,m), 2.82(2H,t,J=7.2Hz), 3.06(1H,m), 3.20-3.30(2H,  
m), 5.34(1H,d,J=6.6Hz), 7.69-7.78(6H,m), 7.96-8.08(2H,m).

IR( $\text{CHCl}_3$ ): 3260, 3020, 2950, 2868, 1708, 1389, 1324, 1162, 1130, 1069 /cm.

$[\alpha]_D = +13.3^\circ$  ( $\text{CHCl}_3, c=1.05, 24.0^\circ\text{C}$ ).

mp. 118-120°C

No.1a - 10

$\text{CDCl}_3, 300\text{MHz}$

0.96-1.98(14H,m), 2.15-2.22(3H,m), 3.04(1H,m), 3.66(3H,s), 5.12-  
5.26(5H,m), 7.67-7.78(4H,m), 7.93-8.07(4H,m).

IR( $\text{CHCl}_3$ ): 3278, 3018, 2946, 2868, 1726, 1598, 1435, 1341, 1162, 1095 /cm.

$[\alpha]_D = -1.5^\circ$  ( $\text{CHCl}_3, c=1.01, 25.0^\circ\text{C}$ ).

mp. 188-189°C.

No.1a - 11

$\text{CD}_3\text{OD}, 300\text{MHz}$

1.05-1.98(14H,m), 2.13-2.22(3H,m), 3.07(1H,m), 3.09-3.22(3H,m), 7.85-  
7.93(4H,m), 7.95-8.05(4H,m).

IR( $\text{KBr}$ ): 3385, 3261, 3069, 3003, 2954, 2872, 1708, 1598, 1428, 1418, 1378, 1348, 1

326, 1236, 1188, 1160, 1096 /cm.

mp. 144-146°C.

No.1a - 1 2

CDCl<sub>3</sub>, 300MHz

0.96-1.96(14H,m), 2.22-2.27(3H,m), 3.03(1H,m), 3.66(3H,s), 3.87(3H,s), 4.88(1H,d,J=6.9Hz), 5.18-5.24(2H,m), 6.99-7.02(2H,m), 7.55-7.66(2H,m), 7.68-7.69(2H,m), 7.89-7.92(2H,m).

IR(CHCl<sub>3</sub>):3374,3270,3018,2946,2868,1726,1608,1518,1487,1458,1427,1348,1157,1037.

[α]<sub>D</sub>=+4.2° (CHCl<sub>3</sub>,c=1.01,24°C).

mp.85-87°C.

No.1a - 1 3

CDCl<sub>3</sub>, 300MHz

0.97-1.99(14H,m), 2.18(1H,m), 2.30(2H,t,J=7.2Hz), 3.04(1H,m), 3.66(3H,s), 5.18(1H,d,J=6.7Hz), 5.23-5.26(2H,m), 6.99-7.02(2H,m), 7.55-7.58(2H,m), 7.66-7.68(2H,m), 7.89-7.92(2H,m).

IR(CHCl<sub>3</sub>):3380,3280,3020,2946,2868,1708,1608,1519,1487,1458,1308,1298,1248,1156 /cm.

[α]<sub>D</sub>=+18.3° (CHCl<sub>3</sub>,c=1.00,25.5°C).

No.1a - 1 4

CDCl<sub>3</sub>, 300MHz

0.98-2.00(14H,m), 2.20(1H,m), 2.25(2H,t,J=7.2Hz), 3.03(1H,m), 3.87(3H,s), 4.85(1H,d,J=6.3Hz), 5.19-5.25(2H,m), 7.18(1H,dd,J=4.8,8.6Hz), 7.89(1H,d,J=4.8Hz), 7.40(1H,d,J=3.6Hz), 7.71-7.74(2H,m), 7.86-7.89(2H,m).

IR(CHCl<sub>3</sub>):3374,3270,3018,2946,2868,1727,1598,1484,1322/cm.

[α]<sub>D</sub>= +8.6° (CHCl<sub>3</sub>,c=1.01,24°C).

mp.69-71°C.

No.1a - 1 5

CDCl<sub>3</sub>, 300MHz

0.95-2.00(14H,m), 2.17(1H,m), 2.82(2H,t,J=7.2Hz), 3.03(1H,m), 3.20(1H,d,J=6.9Hz), 5.24-5.28(2H,m), 7.18(1H,dd,J=4.8,8.6Hz), 7.35(1H,d,J=4.8Hz), 7.43(1H,d,J=8.6Hz), 7.78(2H,d,J=8.4Hz), 7.87(2H,d,J=8.4Hz).

IR(CHCl<sub>3</sub>):3280,3022,2946,2868,1709,1598,1404,1321,1154/cm.

[α]<sub>D</sub>= +20.8° (CHCl<sub>3</sub>,c=1.07,23°C).

mp.71-73°C.

No.1a - 1 6

CDCl<sub>3</sub>, 300MHz

0.98-2.00(14H,m), 2.27(2H,t,J=7.5Hz), 2.38(1H,m), 3.18(1H,m), 3.66(3H,s), 4.90(1H,d,J=8.9Hz), 5.23-5.29(2H,m), 7.40-7.65(2H,m), 7.76(1H,d,J=8.4Hz), 7.90-8.02(4H,m).

IR(CHCl<sub>3</sub>):3376,3276,3018,2946,2868,1726,1598,1488,1394,1322,1159/cm.

[α]<sub>D</sub>= +7.0° (CHCl<sub>3</sub>,c=1.07,24°C).

No.1a - 1 7

CDCl<sub>3</sub>, 300MHz

1.02-2.07(14H,m), 2.25(1H,m), 2.34(2H,t,J=6.6Hz), 3.14(1H,m), 5.23-5.33(3H,m), 7.39-7.57(4H,m), 7.62-7.65(2H,m), 7.76(1H,d,J=8.1Hz), 7.89-8.03(4H,m).

IR(CHCl<sub>3</sub>):3260,2946,2868,1709,1598,1394,1324,1157/cm.

[α]<sub>D</sub>=+20.2° (CHCl<sub>3</sub>,c=1.02,24°C).

No.1a - 1 8

CDCl<sub>3</sub>, 300MHz

1.05-1.97(14H,m), 2.25(2H,t,J=7.2Hz), 2.33(1H,m), 3.12(1H,m), 3.67(3H,s), 4.91(1H,d,J=6.6Hz), 5.24-5.29(2H,m), 7.94(1H,d,J=8.9Hz), 7.89-7.65(3H,m), 7.56(1H,d,J=8.9Hz), 7.59-7.62(2H,m).

IR(CHCl<sub>3</sub>):3372,3372,,3018,2946,2868,1727,1438,1381,1152/cm.

[α]<sub>D</sub>=-5.7° (CHCl<sub>3</sub>,c=1.01,23°C).

No.1a - 1 9

CDCl<sub>3</sub>, 300MHz

1.05-2.05(14H,m),2.28-2.33(3H,m),3.18(1H,m),5.18(1H,d,J=6.8Hz),5.27-5.31(2H,m),7.24(1H,d,J=4.2Hz),7.39-7.42(8H,m),7.58(1H,d,J=4.2Hz),7.58-7.62(2H,m).

IR(CHCl<sub>3</sub>):3372,3354,3018,2946,2868,1707,1431,1381,1151/cm.

[α]<sub>D</sub>=+4.5° (CHCl<sub>3</sub>,c=1.01,21.5°C).

No.1a - 2 0

CDCl<sub>3</sub>, 300MHz

1.05-2.00(14H,m),2.28(2H,t,J=7.5Hz),3.23(1H,m),3.11(1H,m),3.68(3H,s),4.92(1H,d,J=8.0Hz),5.27(2H,m),7.06(1H,m),7.10(1H,d,J=8.6Hz),7.25(1H,m),7.32(1H,m),7.49(1H,d,J=8.6Hz).

IR(CHCl<sub>3</sub>):3372,3272,3018,2946,2868,1727,1458,1417,1381,1151/cm.

[α]<sub>D</sub>=-9.2° (CHCl<sub>3</sub>,c=1.01,25°C).

No.1a - 2 1

CDCl<sub>3</sub>, 300MHz

1.02-2.01(14H,m),2.28-2.34(8H,m),3.13(1H,m),5.12(1H,d,J=6.9Hz),5.28-5.32(2H,m),7.06(1H,m),7.10(1H,d,J=3.9Hz),7.25(1H,m),7.32(1H,m),7.80(1H,d,J=8.9Hz).

IR(CHCl<sub>3</sub>):3350,3250,2946,1709,1440,1420,1380,1151.

[α]<sub>D</sub>=+2.5° (CHCl<sub>3</sub>,c=1.00,25°C).

No.1a - 2 2

CDCl<sub>3</sub>, 300MHz

0.96-2.05(14H,m),2.25(1H,m),2.85(2H,t,J=7.0Hz),3.11(1H,m),3.20-3.34(2H,m),3.41(1H,d,J=8.6Hz),7.31-7.49(8H,m),7.52(1H,d,J=7.8Hz),8.11(1H,d,d,J=1.8 Hz),8.86(1H,d,J=1.8Hz).

IR(CHCl<sub>3</sub>):3384,3271,3025,2958,1708,1608,1559,1527,1357,1153/cm.

[α]<sub>D</sub>=+18.8° (CHCl<sub>3</sub>,c=0.81,22°C).

No.1a - 2 3

CDCl<sub>3</sub>, 300MHz

0.97-2.07(14H,m),2.24(1H,m),2.85(2H,t,J=6.8Hz),3.09(1H,m),3.86(3H,s),5.24-5.35(2H,m),5.44(1H,d,J=6.8Hz),6.97-7.00(2H,m),7.26-7.28(2H,m),7.59(1H,d,J=8.1Hz),8.06(1H,d,d,J=2.1 and 8.1Hz),8.19(1H,d,J=2.1Hz).

IR(CHCl<sub>3</sub>):3384,3270,2959,1709,1609,1558,1519,1357,1302,1258,1226,1169/cm.

[α]<sub>D</sub>=+17.0° (CHCl<sub>3</sub>,c=1.00,21°C).

No.1 No.1a - 2 4

CDCl<sub>3</sub>, 300MHz

0.95-2.00(14H,m),2.20-2.25(1H,m),2.26(2H,t,J=7.2Hz),3.02-3.10(1H,m),3.66(3H,s),4.92(1H,d,J=6.6Hz),5.18-5.31(3H,m),7.52-7.60(8H,m),7.94-8.08(6H,m).

IR(CHCl<sub>3</sub>):3376,3020,2946,2868,1726,1436,1386,1298,1164,1090,890/cm.

[α]<sub>D</sub>=+11.2±0.5° (CHCl<sub>3</sub>,c=1.04,28.5°C)

mp.101-108°C

No.1a - 2 5

CDCl<sub>3</sub>, 300MHz

0.95-2.05(14H,m),2.15-2.23(1H,m),2.88(2H,t,J=6.8Hz),3.02-3.10(1H,m),5.21-5.31(2H,m),5.84(1H,d,J=5.8Hz),7.51-7.59(3H,m),7.92-8.07(8H,m).

IR(CHCl<sub>3</sub>):3258,3022,2948,2868,1707,1399,1328,1298,1168,1089,1051,892/cm

iii.

$[\alpha]_D = +29.8 \pm 0.7^\circ$  ( $\text{CHCl}_3, c=1.04, 25^\circ\text{C}$ )  
 $\text{mp. } 158\text{-}160^\circ\text{C}$

No.1a - 2 6

$\text{CaHgMoO}_4\text{Na } 0.8540$ 에 대 천소분석 계산치: C, 60.39; H, 6.15; N, 8.11; S, 6.19; Na, 4.44; 측정치: C, 60.15; H, 6.19; N, 8.15; S, 6.08; Na, 4.98.  
 $[\alpha]_D = -16.6^\circ$  ( $\text{CHCl}_3, c=1.04, 25.0^\circ\text{C}$ ).

No.1a - 2 7

$\text{CDCl}_3, 300\text{MHz}$

0.92-1.96(14H, m), 2.20(1H, m), 2.26(2H, t,  $J=7.5\text{Hz}$ ), 3.08(1H, m), 3.12(6H, s), 3.86(3H, s), 4.87(1H, d,  $J=8.6\text{Hz}$ ), 5.18-5.82(2H, m), 6.73-6.80(2H, m), 7.85-8.00(6H, m).

IR( $\text{CHCl}_3$ ): 3376, 3020, 2946, 1726, 1601, 1518, 1442, 1419, 1362, 1312, 1163, 1188, 1088 /cm.

$[\alpha]_D = +55.3^\circ$  ( $\text{CHCl}_3, c=0.53, 24.0^\circ\text{C}$ ).

$\text{mp. } 158\text{-}168^\circ\text{C}$

No.1a - 2 8

$\text{CDCl}_3+\text{CD}_3\text{OD } 800\text{MHz}$

0.99-3.14(14H, m), 2.21(1H, m), 2.81(2H, t,  $J=7.2\text{Hz}$ ), 3.84(1H, m), 3.12(6H, s), 5.22-5.88(2H, m), 6.73-6.81(2H, m), 7.87-8.00(6H, m).

IR( $\text{KBr}$ ): 3484, 3309, 2946, 1708, 1604, 1520, 1442, 1418, 1366, 1312, 1262, 1164, 155, 1134, 1091 /cm.

$[\alpha]_D =$  측정할 수 없음 (유색, 불충분한 에너지)

$\text{mp. } 198\text{-}198^\circ\text{C}$

No.1a - 2 9

$\text{CD}_3\text{OD } 800\text{MHz}$

1.02-1.96(14H, m), 2.10(2H, t,  $J=7.5\text{Hz}$ ), 2.16(1H, m), 2.98(1H, m), 3.11(6H, s), 5.07-5.87(2H, m), 6.80-6.87(2H, m), 7.84-8.00(6H, m).

IR( $\text{KBr}$ ): 3428, 3087, 2904, 2949, 2871, 1604, 1565, 1520, 1444, 1420, 1364, 1312, 1253, 11688, 1126, 1090 /cm.

$[\alpha]_D =$  측정할 수 없음

No.1a - 3 0

$\text{CDCl}_3, 300\text{MHz}$

0.95-1.99(14H, m), 2.22(1H, m), 2.26(2H, t,  $J=7.2\text{Hz}$ ), 2.35(3H, s), 3.06(1H, m), 3.66(3H, s), 4.98(1H, d,  $J=8.6\text{Hz}$ ), 5.15-5.80(2H, m), 7.26-7.82(2H, m), 7.97-8.06(6H, m).

IR( $\text{CHCl}_3$ ): 3374, 2996, 2946, 2868, 1768, 1728, 1591, 1495, 1435, 1368, 1299, 1238, 1192, 1163, 1138 /cm.

$[\alpha]_D = +12.9^\circ$  ( $\text{CHCl}_3, c=1.04, 26.0^\circ\text{C}$ ).

No.1a - 3 1

$\text{CDCl}_3, 300\text{MHz}$

0.93-2.01(14H, m), 2.19(1H, m), 2.31(2H, t,  $J=7.2\text{Hz}$ ), 2.85(3H, s), 3.06(1H, m), 5.17-5.82(2H, m), 7.25-7.32(2H, m), 7.96-8.07(6H, m).

IR( $\text{CHCl}_3$ ): 3267, 3028, 2962, 2874, 1769, 1708, 1592, 1495, 1368, 1328, 1299, 1168, 1138, 1088, 1050, 1008/cm.

$[\alpha]_D = +21.7^\circ$  ( $\text{CHCl}_3, c=0.51, 22^\circ\text{C}$ ).

No.1a - 3 2

$\text{CDCl}_3, 800\text{MHz}$

0.98-1.99(14H, m), 2.21(1H, m), 2.27(2H, t,  $J=7.2\text{Hz}$ ), 3.05(1H, m), 3.87(3H, s), 4.92(1H, d,  $J=8.6\text{Hz}$ ), 5.15-5.80(2H, m), 6.72(1H, s), 6.96-7.00(2H, m), 7.86-8.04(6H, m).

IR(CHCl<sub>3</sub>): 3374, 2878, 3018, 2946, 2868, 1725, 1606, 1585, 1502, 1488, 1395, 1350,  
1271, 1184, 1135, 1099 /cm. [α]<sub>D</sub>= +18.6° (CHCl<sub>3</sub>, c=1.00, 24.0°C).

No.1a - 3 3

5 CDCl<sub>3</sub>+CD<sub>3</sub>OD 300MHz  
0.98-2.08(14H,m), 2.20(1H,m), 2.23(2H,t,J=7.4Hz), 2.38(1H,m), 5.18-5.33(3H,  
m), 6.92-6.99(2H,m), 7.55-8.02(6H,m).  
IR(KBr): 3385, 3245, 2948, 2876, 1717, 1601, 1505, 1480, 1399, 1298, 1250, 1219, 1  
166, 1136, 1092 /cm.  
10 [α]<sub>D</sub>= -16.0° (CH<sub>3</sub>OH, c=1.00, 24.0°C).  
mp. 208-210°C

No.1a - 3 4

mp. 82-83°C [α]<sub>D</sub>= +10.6° (CHCl<sub>3</sub>, c=1.01, 23.5°C).

15

No.1a - 3 5

mp. 80-82°C [α]<sub>D</sub>= -1.8° (CHCl<sub>3</sub>, c=1.07, 22.0°C).

No.1a - 3 6

20 TLC Rf=0.25 (에틸아세테이트/α-페산 = 1:1 (0.8% α-페산))

No.1a - 3 7

CDCl<sub>3</sub> 300MHz  
0.92-1.96(14H,m), 2.21(1H,m), 2.27(2H,t,J=7.4Hz), 3.01(1H,m), 3.66(3H,s), 4.7  
26 1(1H,d,J=6.6Hz), 5.14-5.29(2H,m), 7.12(1H,d,J=16.2Hz), 7.34(1H,d,J=16.2Hz),  
7.28-7.42(3H,m), 7.52-7.56(2H,m), 7.68(2H,d,J=8.7Hz), 7.88(2H,d,J=8.7Hz).  
IR(CHCl<sub>3</sub>): 3384, 3288, 3028, 2954, 2876, 1780, 1595, 1494, 1317, 1163, 1147 /cm.  
[α]<sub>D</sub>= +10.5° (CHCl<sub>3</sub>, c=1.01, 24°C).  
mp 116-117 °C.

No.1a - 3 8

CDCl<sub>3</sub> 300MHz

0.93-1.99(14H,m), 2.17(1H,m), 2.32(2H,t,J=7.2Hz), 3.02(1H,m), 5.23-5.29(3H,  
m), 7.11(1H,d,J=16.2Hz), 7.28(1H,d,J=16.2Hz), 7.28-7.41(3H,m), 7.52-7.55(2H,  
m), 7.61(2H,d,J=8.7Hz), 7.86(2H,d,J=8.7Hz).

IR(CHCl<sub>3</sub>): 3315, 3384, 3270, 3022, 3015, 2957, 2876, 2689, 1708, 1595, 1496, 1320,  
1167 /cm.

[α]<sub>D</sub>= +27.1° (CHCl<sub>3</sub>, c=1.02, 24°C).

No.1a - 3 9

CDCl<sub>3</sub> 300MHz

0.92-1.99(14H,m), 2.15(1H,m), 2.28(3H,t,J=7.4Hz), 3.01(1H,m), 3.68(3H,s), 4.9  
6(1H,d,J=6.6Hz), 5.18-5.32(2H,m), 6.60(1H,d,J=12.0Hz), 6.74(1H,d,J=12.0Hz),  
7.18-7.28(5H,m), 7.85(2H,d,J=8.4Hz), 7.72(2H,d,J=8.4Hz).

IR(CHCl<sub>3</sub>): 3384, 3288, 3028, 3015, 2954, 2876, 1780, 1595, 1498, 1324, 1168, 1147  
/cm.

[α]<sub>D</sub>= +13.7° (CHCl<sub>3</sub>, c=1.00, 24°C).

No.1a - 4 0

CDCl<sub>3</sub> 300MHz

0.90-2.16(14H,m), 2.12(1H,m), 2.34(2H,t,J=7.2Hz), 3.02(1H,m), 5.16(1H,d,J=6.  
9Hz), 5.23-5.34(2H,m), 6.60(1H,d,J=12.8Hz), 6.74(1H,d,J=12.8Hz), 7.14-7.24(  
5H,m), 7.85(2H,d,J=8.1Hz), 7.72(2H,d,J=8.1Hz).

IR(CHCl<sub>3</sub>): 3315, 3384, 3269, 3025, 3021, 3014, 2957, 2876, 2668, 1709, 1595, 1322,  
1162, 1147 /cm.

[α]<sub>D</sub>= +38.4° (CHCl<sub>3</sub>, c=1.00, 24°C).

No.1a - 4 1

**CDCl<sub>3</sub>, 300MHz**  
**0.98-1.99(14H,m), 2.17(1H,m), 2.23(2H,t,J=7.2Hz), 2.00(1H,m), 2.04(2H,s),**  
**5.20-5.28(2H,m), 6.90-6.95(2H,m), 6.96(1H,d,J=18.2Hz), 7.17(1H,d,J=**  
**18.2Hz), 7.46-7.49(2H,m), 7.55(2H,d,J=8.4Hz), 7.63(2H,d,J=8.4Hz).**  
**IR(CHCl<sub>3</sub>): 3258, 3018, 2980, 1709, 1590, 1509, 1457, 1404, 1302, 1350, 1153**  
**/cm.**  
**[α]<sub>D</sub>=+30.3° (CHCl<sub>3</sub>, c=1.00, 25°C).**  
**mp.99-100 °C**

**No.1a - 4 2**  
**CDCl<sub>3</sub>, 300MHz**  
**1.01-1.99(14H,m), 2.28(2H,t,J=7.2Hz), 2.30(1H,m), 2.10(1H,m), 2.56(2H,s), 5.0**  
**7(1H,br), 5.25-5.30(2H,m), 6.98-7.04(2H,m), 7.16(1H,d,J=18.2Hz), 7.28-7.37(2**  
**H,m), 7.47-7.50(2H,m).**  
**IR(CHCl<sub>3</sub>): 3372, 3276, 3020, 2946, 2870, 1737, 1491, 1488, 1331, 1152 /cm.**  
**[α]<sub>D</sub>= -11.6° (CHCl<sub>3</sub>, c=1.07, 21.5°C).**

**No.1a - 4 3**  
**CDCl<sub>3</sub>, 300MHz**  
**0.98-2.00(14H,m), 2.11-2.36(2H,m), 3.12(1H,m), 5.10(1H,d,J=6.6Hz), 5.39-**  
**5.32(2H,m), 6.98-7.04(2H,m), 7.23(1H,d,J=21.6Hz), 7.32-7.49(2H,m).**  
**IR(CHCl<sub>3</sub>): 3380, 3246, 3020, 2946, 2868, 1709, 1491, 1480, 1329, 1151 /cm.**  
**[α]<sub>D</sub>= +3.4° (CHCl<sub>3</sub>, c=1.03, 25°C).**

**No.1a - 4 4**  
**CDCl<sub>3</sub>, 300MHz**  
**1.00-2.00(14H,m), 2.19(1H,m), 2.29(2H,t,J=7.4Hz), 2.30-2.19(5H,m), 2.68(2H,s)**  
**), 4.74(1H,d,J=6.6Hz), 5.15-5.30(2H,m), 7.18-7.29(2H,m), 7.76(2H,d,J=8.1Hz).**  
**IR(CHCl<sub>3</sub>): 3384, 3282, 3068, 3028, 3016, 2958, 2876, 1730, 1599, 1496, 1319,**  
**1157 /cm.**  
**[α]<sub>D</sub>=+2.3° (CHCl<sub>3</sub>, c=1.00, 25°C).**  
**mp.85.0-86.0°C**

**No.1a - 4 5**  
**CDCl<sub>3</sub>, 300MHz**  
**0.90-2.05(14H,m), 2.09(1H,m), 2.36(2H,t,J=6.9Hz), 2.90-3.13(5H,m), 5.18(1H,**  
**d,J=6.6Hz), 5.34-5.34(2H,m), 7.10-7.27(2H,m), 7.76(2H,d,J=8.4Hz).**  
**IR(CHCl<sub>3</sub>): 3310, 3384, 3270, 3067, 3063, 3028, 3018, 3014, 2955, 2876, 2870, 1708,**  
**1599, 1496, 1318, 1157 /cm.**  
**[α]<sub>D</sub>=+8.5° (CHCl<sub>3</sub>, c=1.01, 25°C).**

**No.1a - 4 6**  
**[α]<sub>D</sub>=+6.8° (CHCl<sub>3</sub>, c=1.05, 25°C). mp.99-100°C.**

**No.1a - 4 7**  
**CDCl<sub>3</sub>, 300MHz**  
**0.87-2.01(14H,m), 2.14(1H,m), 2.36(2H,t,J=7.2Hz), 2.02(1H,m), 2.28(1H,d,J=5.**  
**4Hz), 5.26-5.30(2H,m), 7.27-7.39(3H,m), 7.64-7.55(2H,m), 7.63-7.66(2H,m), 7.8**  
**-7.88(2H,m).**  
**IR(CHCl<sub>3</sub>): 3276, 3260, 3022, 2946, 2212, 1707, 1596, 1497, 1396, 1322, 1160 /cm.**  
**[α]<sub>D</sub>=+25.0° (CHCl<sub>3</sub>, c=1.02, 24°C). mp.117-118°C.**

**No.1a - 4 8**  
**CD<sub>3</sub>OD, 300MHz**  
**1.05-1.98(14H,m), 2.10-2.15(3H,m), 2.36(1H,m), 5.05-5.28(2H,m), 7.38-7.40(3**  
**H,m), 7.554-7.56(2H,m), 7.69(1H,d,J=8.4Hz), 7.87(1H,d,J=8.4Hz).**

**No.1a - 4 9**

CDCl<sub>3</sub> 300MHz

0.96-1.97(14H,m),2.24(1H,m),2.31(2H,t,J=6.9Hz),3.05(1H,m),3.69(3H,s),5.15(1H,d,J=6.6Hz),5.25-5.37(2H,m),7.40-7.48(2H,m),7.61-7.64(2H,m),7.88(1H,d,J=6.1Hz),8.07(1H,dd,J=8.1,1.8Hz),8.58(1H,d,J=1.8Hz).

IR(CHCl<sub>3</sub>):3874,3020,2948,2870,2212,1736,1606,1580,1498,1437,1346,1167/cm.

[α]<sub>D</sub>=+2.4° (CHCl<sub>3</sub>,c=1.00,26°C). mp.77-79°C.

No.1a - 5 0

CDCl<sub>3</sub> 300MHz

1.00-2.02(14H,m),2.20(1H,m),2.34(2H,t,J=6.6Hz),3.08(1H,m),3.28-3.39(2H,m),5.41(1H,d,J=6.9Hz),7.40-7.48(2H,m),7.61-7.64(2H,m),7.84(1H,d,J=6.1Hz),8.07(1H,dd,J=8.4,1.8Hz),8.57(1H,dd,J=1.8Hz).

IR(CHCl<sub>3</sub>):3380,3254,2952,2880,2212,1707,1606,1581,1498,1409,1344,1166.

[α]<sub>D</sub>=+28.4° (CHCl<sub>3</sub>,c=1.00,25°C).

No.1a - 5 1

CDCl<sub>3</sub> 300MHz

0.95-1.98(14H,m),2.23(1H,m),2.30(2H,t,J=7.2Hz),3.00(1H,m),3.66(3H,s),4.56(2H,br),4.70(1H,d,J=6.9Hz),5.20-5.29(2H,m),7.15(1H,dd,J=7.8,1.8Hz),7.23(1H,d,J=1.8Hz),7.35-7.39(2H,m),7.46(1H,d,J=7.8Hz),7.53-7.56(2H,m).

IR(CHCl<sub>3</sub>):3494,3386,3028,2952,2874,1725,1611,1589,1497,1423,1317,1162/cm.

No.1a - 5 2

CDCl<sub>3</sub> 300MHz

0.96-2.04(16H,m),2.30(1H,m),2.38(2H,t,J=6.9Hz),3.09(1H,m),3.17(1H,d,J=6.3Hz),3.28-3.31(2H,m),7.18(1H,dd,J=9.6,1.8Hz),7.25(1H,m),7.35-7.39(3H,m),7.46(1H,d,J=7.8Hz),7.52-7.56(2H,m).

IR(CHCl<sub>3</sub>):3482,3378,3360,3022,2948,2868,1708,161

2,1498,1422,1317/cm.

[α]<sub>D</sub>=+15.0° (CHCl<sub>3</sub>,c=1.00,24°C).

No.1a - 5 3

CDCl<sub>3</sub> 300MHz

1.01-2.05(15H,m),2.31(2H,t,J=7.2Hz),3.10(1H,m),3.67(3H,s),6.02(1H,br),6.36-6.38(2H,m),7.18(1H,d,J=4.2Hz),7.35-7.39(2H,m),7.48(1H,d,J=4.2Hz),7.51-7.55(2H,m).

IR(CHCl<sub>3</sub>):3372,3270,3018,3004,2946,2868,2202,1726,1486,1488,1326,1116/cm.

[α]<sub>D</sub>=+0.6° (CHCl<sub>3</sub>,c=1.11,25°C). [α]<sub>25</sub>+17.8° (CHCl<sub>3</sub>,c=1.11,25°C).

No.1a - 5 4

CDCl<sub>3</sub> 300MHz

0.99-2.11(14H,m),2.27(1H,m),2.37(2H,t,J=7.5Hz),3.18(1H,m),3.18(1H,d,J=8.6Hz),3.51-3.55(2H,m),7.18(1H,d,J=8.6Hz),7.27-7.39(3H,m),7.50(1H,d,J=9.8Hz),7.52-7.56(2H,m).

IR(CHCl<sub>3</sub>):3484,3370,3246,2948,2868,2202,1708,1486,1429,1336,1153/cm.

[α]<sub>D</sub>=+17.8° (CHCl<sub>3</sub>,c=1.00,24°C). mp.95-98°C.

No.1a - 5 5

CDCl<sub>3</sub> 300MHz

0.96-1.93(14H,m),2.16(1H,m),2.34(2H,t,J=7.5Hz),3.00(1H,m),3.66(3H,s),5.10-5.30(3H,m),7.40-7.50(7H,m),7.70(1H,d,J=7.5Hz),8.08(1H,d,J=8.1Hz). IR

(CHCl<sub>3</sub>):3386,3020,2948,2868,2210,1737,1490,1458,1437,1341,1165/cm. [α]

=-58.4° (CHCl<sub>3</sub>,c=1.00,26°C). mp.84-85°C.

No.1a - 5 6  
 $\text{CDCl}_3$ , 800MHz  
 0.95-1.95(14H,m), 2.10(1H,m), 2.27(2H,t,J=6.9Hz), 2.00(1H,m), 5.17-5.21(2H,m), 5.28(1H,d,J=6.9Hz), 7.39-7.60(7H,m), 7.70(1H,dd,J=7.8,1.5Hz), 8.07(1H,J=6.8,1.5Hz).  
 IR( $\text{CHCl}_3$ ): 3364, 3034, 2952, 2874, 2212, 1707, 1597, 1491, 1458, 1411, 1341, 1164/cm.  
 $[\alpha]_D=-48.1^\circ$  ( $\text{CHCl}_3$ , c=1.00, 25°C).

No.1a - 5 7  
 $\text{CDCl}_3$ , 300MHz  
 0.99-1.97(14H,m), 2.23-2.30(3H,m), 2.01(1H,m), 2.67(3H,s), 5.17-5.26(3H,m), 7.36-7.38(8H,m), 7.50-7.55(3H,m), 7.60(1H,m), 7.83(1H,m), 8.06(1H,m).  
 IR( $\text{CHCl}_3$ ): 3376, 3020, 2946, 2870, 1737, 1598, 1491, 1487, 1412, 1350, 1345, 1162/cm.  
 $[\alpha]_D=-12.7^\circ$  ( $\text{CHCl}_3$ , c=1.00, 24°C).

No.1a - 5 8  
 $\text{CDCl}_3$ , 800MHz  
 0.97-1.98(14H,m), 2.20(1H,m), 2.38(2H,t,J=6.9Hz), 2.02(1H,m), 5.19-5.28(3H,m), 7.36-7.38(8H,m), 7.47-7.55(3H,m), 7.69(1H,m), 7.83(1H,m), 8.04(1H,m).  
 IR( $\text{CHCl}_3$ ): 3376, 3260, 3022, 2902, 2948, 2868, 2220, 1708, 1598, 1490, 1455, 1412, 1327, 1162/cm.  
 $[\alpha]_D=-8.6^\circ$  ( $\text{CHCl}_3$ , c=1.01, 24°C).

No.1a - 5 9  
 $\text{CDCl}_3$ , 300MHz  
 0.95-1.99(24H,m), 2.20(1H,m), 2.28(2H,t,J=7.8Hz), 2.58(1H,s), 2.98(1H,m), 3.89(3H,s), 4.99(1H,d,J=6.6Hz), 5.18-5.20(2H,m), 7.53(2H,d,J=8.4Hz), 7.82(2H,d,J=8.4Hz).  
 IR( $\text{CHCl}_3$ ): 3383, 3376, 3002, 2936, 2852, 1725, 1591, 1490, 1487, 1393, 1325, 1160/cm.  
 $[\alpha]_D=-8.8^\circ$  ( $\text{CHCl}_3$ , c=1.00, 24°C).

No.1a - 6 0  
 $\text{CDCl}_3$ , 800MHz  
 0.96-2.05(24H,m), 2.22(1H,m), 2.38(2H,m), 2.88(1H,m), 5.22-5.36(3H,m), 5.80(1H,d,J=6.7Hz), 7.50(2H,d,J=8.7Hz), 7.80(3H,d,J=8.7Hz).  
 IR( $\text{CHCl}_3$ ): 3376, 3260, 3022, 2936, 2852, 1710, 1592, 1491, 1458, 1395, 1325, 1159/cm.  
 $[\alpha]_D=-8.9^\circ$  ( $\text{CHCl}_3$ , c=1.00, 24°C),  
 mp. 88-91°C

No.1a - 6 1  
 $\text{CDCl}_3$ , 800MHz  
 0.95-2.24(23H,m), 2.29(2H,m), 2.99(1H,m), 3.69(3H,s), 4.78(1H,d,J=6.8Hz), 5.1-5.24(2H,m), 6.28(1H,m), 7.50-7.52(2H,m), 7.77-7.80(2H,m).  
 IR( $\text{CHCl}_3$ ): 3374, 3270, 3018, 2942, 2868, 2196, 1726, 1589, 1490, 1485, 1324, 1158/cm.  
 $[\alpha]_D=+7.7^\circ$  ( $\text{CHCl}_3$ , c=1.02, 24°C), mp. 88-95°C

No.1a - 6 2  
 $\text{CDCl}_3$ , 300MHz  
 0.96-2.45(23H,m), 2.36(2H,d,J=6.9Hz), 2.99(1H,m), 5.34(1H,d,J=6.8Hz), 5.24-5.32(2H,m), 6.28(1H,m), 7.50-7.58(2H,m), 7.78-7.81(2H,m). IR( $\text{CHCl}_3$ ): 3468, 3374, 3260, 3020, 2942, 2868, 2196, 1598, 1490, 1455, 1398, 1322, 1157/cm.  
 $[\alpha]_D=+19.4^\circ$  ( $\text{CHCl}_3$ , c=1.03, 24°C).

No.1a - 6 3

CDCl<sub>3</sub>, 300MHz

0.95-1.95(2H,m), 2.18(1H,m), 2.29(2H,t,J=7.2Hz), 3.43(2H,t,J=6.9Hz), 3.94(1H,m), 3.69(3H,s), 4.95(1H,d,J=6.9Hz), 5.21-5.24(2H,m), 7.49(2H,d,J=8.7Hz), 7.79(2H,J=8.7Hz).

IR(CHCl<sub>3</sub>): 3376, 3016, 2946, 2866, 2222, 1727, 1692, 1456, 1435, 1326, 1158/cm.  
[α]<sub>D</sub>=+2.7° (CHCl<sub>3</sub>, c=1.00, 25°C).

No.1a - 6 4

CDCl<sub>3</sub>, 300MHz

0.95-1.97(2H,m), 2.35(2H,t,J=7.2Hz), 3.43(2H,t,J=7.2Hz), 3.90(1H,m), 5.03(1H,d,J=6.6Hz), 5.28-5.27(2H,m), 7.49(2H,d,J=8.7Hz), 7.78(2H,d,J=8.7Hz).

IR(CHCl<sub>3</sub>): 3260, 3020, 2948, 2864, 2222, 1708, 1692, 1469, 1456, 1397, 1324, 1156/cm.

[α]<sub>D</sub>=+14.4° (CHCl<sub>3</sub>, c=1.00, 25°C). mp. 70-71°C.

No.1a - 6 5

CDCl<sub>3</sub>, 300MHz

0.95-1.98(14H,m), 2.18(1H,m), 2.30(2H,t,J=7.2Hz), 3.00(1H,m), 3.67(3H,s), 4.83(1H,d,J=6.9Hz), 5.29-5.25(2H,m), 5.84(1H,br), 5.82-6.85(2H,m), 7.42-7.45(3H,m), 7.59-7.62(2H,m), 7.82-7.85(2H,m).

IR(CHCl<sub>3</sub>): 3376, 3274, 3016, 2946, 2866, 2206, 1725, 1607, 1587, 1514, 1485, 1325, 1270, 1162, 1133/cm.

[α]<sub>D</sub>=+9.1° (CHCl<sub>3</sub>, c=1.00, 25°C). mp. 111-112°C

No.1a - 6 6

CDCl<sub>3</sub>, 300MHz

0.97-2.03(14H,m), 2.15(1H,m), 2.35(2H,t,J=7.6Hz), 3.00(1H,m), 5.17(1H,d,J=8.6Hz), 5.26-5.30(2H,m), 6.82-6.85(2H,m), 7.42-7.45(3H,m), 7.59-7.62(2H,m), 7.82-7.85(2H,m).

IR(CHCl<sub>3</sub>): 3260, 2948, 2870, 2208, 1708, 1607, 1587, 1514, 1496, 1325, 1270, 1162, 1133/cm.  
[α]<sub>D</sub>=-21.0° (CHCl<sub>3</sub>, c=1.00, 25°C). mp. 161-162°C

No.1a - 6 7

CDCl<sub>3</sub>, 300MHz

0.95-1.98(14H,m), 2.20(1H,m), 2.39(3H,t,J=7.2Hz), 3.01(1H,m), 3.67(3H,s), 4.82(1H,d,J=6.6Hz), 5.19-5.27(2H,m), 7.05-7.10(2H,m), 7.51-7.56(3H,m), 7.61-7.64(2H,m), 7.84-7.87(2H,m).

IR(CHCl<sub>3</sub>): 3374, 3260, 3020, 2946, 2866, 2214, 1727, 1689, 1509, 1485, 1327, 1288, 1161, 1134/cm.

[α]<sub>D</sub>=+6.7° (CHCl<sub>3</sub>, c=1.01, 24°C). mp. 84-85°C

No.1a - 6 8

CDCl<sub>3</sub>, 300MHz

0.96-2.01(14H,m), 2.15(1H,m), 2.34(2H,t,J=6.9Hz), 3.02(1H,m), 5.33-5.27(3H,m), 7.04-7.10(2H,m), 7.51-7.56(2H,m), 7.61-7.64(2H,m), 7.85-7.88(2H,m).

IR(CHCl<sub>3</sub>): 3374, 3258, 3020, 2948, 2868, 2214, 1708, 1589, 1509, 1455, 1398, 1322, 1156/cm.

[α]<sub>D</sub>=+22.6° (CHCl<sub>3</sub>, c=1.02, 24°C). mp. 185-186°C

No.1a - 6 9

CDCl<sub>3</sub>, 300MHz

0.95-1.98(14H,m), 2.19(1H,m), 2.29(2H,t,J=7.2Hz), 2.89(3H,s), 3.01(1H,m), 3.69(3H,s), 4.80(1H,d,J=6.6Hz), 5.20-5.29(2H,m), 7.18(2H,d,J=8.1Hz), 7.44(2H,d,J=8.1Hz), 7.82(2H,d,J=8.4Hz), 7.84(2H,d,J=8.4Hz).

IR(CHCl<sub>3</sub>): 3374, 3022, 2946, 2868, 2210, 1727, 1689, 1511, 1486, 1326, 1161, 1133/cm.

$[\alpha]_D = +9.2^\circ$  (CHCl<sub>3</sub>, c=1.02, 24°C).  
mp. 116-118°C

No. 1a - 7 0  
CDCl<sub>3</sub>, 300MHz  
1.15-2.00(1H,m), 2.13(1H,m), 2.33-2.38(5H,m), 3.04(1H,m), 3.14(1H,d,J=6.6Hz), 3.25-3.30(3H,m), 7.17(2H,d,J=7.8Hz), 7.44(2H,d,J=7.8Hz), 7.63(2H,d,J=8.4Hz), 7.65(2H,d,J=8.4Hz).  
IR(CHCl<sub>3</sub>): 3360, 3360, 3030, 2946, 2868, 2210, 1708, 1590, 1511, 1396, 1324, 1160, 1138/cm.  
 $[\alpha]_D = +24.6^\circ$  (CHCl<sub>3</sub>, c=1.00, 24°C).

No. 1a - 7 1  
CDCl<sub>3</sub>, 300MHz  
0.96-1.96(14H,m), 2.19(1H,m), 2.39(2H,t,J=7.2Hz), 3.00(1H,m), 3.20(1H,s), 3.8(8H,s), 4.81(1H,d,J=6.6Hz), 5.20-5.27(2H,m), 7.46-7.54(4H,m), 7.62-7.65(3H,m), 7.85-7.88(3H,m).  
IR(CHCl<sub>3</sub>): 3374, 3290, 3018, 3003, 2946, 2868, 2210, 2110, 1726, 1591, 1507, 1485, 1401, 1324, 1181/cm.  
 $[\alpha]_D = +9.6^\circ$  (CHCl<sub>3</sub>, c=1.01, 24°C). mp. 136-138°C.

No. 1a - 7 2  
CDCl<sub>3</sub>, 300MHz  
0.96-2.01(14H,m), 2.14(1H,m), 2.35(3H,t,J=7.2Hz), 3.06(1H,m), 3.20(1H,s), 5.16(1H,d,J=7.2Hz), 5.26-5.29(2H,m), 7.45-7.53(4H,m), 7.68(3H,d,J=8.4Hz), 7.87(2H,d,J=8.4Hz).  
IR(CHCl<sub>3</sub>): 3462, 3374, 3290, 3024, 2946, 2868, 2210, 2110, 1708, 1591, 1508, 1485, 1401, 1321, 1274, 1180, 1182/cm.  
 $[\alpha]_D = +24.3^\circ$  (CHCl<sub>3</sub>, c=1.08, 24°C). mp. 98-99°C

No. 1a - 7 3  
CDCl<sub>3</sub>, 300MHz  
0.95-1.98(14H,m), 2.19(1H,m), 2.27-2.33(5H,m), 3.01(1H,m), 3.67(3H,s), 4.80(1H,d,J=6.6Hz), 5.20-5.27(2H,m), 7.12(2H,m), 7.56(2H,m), 7.63(2H,m), 7.84(3H,m).  
IR(CHCl<sub>3</sub>): 3374, 3276, 3018, 3046, 2868, 2214, 1762, 1730, 1559, 1506, 1435, 1366, 1161/cm.  
 $[\alpha]_D = +7.8^\circ$  (CHCl<sub>3</sub>, c=1.02, 24°C). mp. 103-104°C

No. 1a - 7 4  
CDCl<sub>3</sub>, 300MHz  
0.95-2.05(14H,m), 2.15(1H,m), 2.32-2.37(5H,m), 3.03(1H,m), 3.14(1H,d,J=6.6Hz), 3.26-3.30(3H,m), 7.10-7.13(2H,m), 7.54-7.57(3H,m), 7.62-7.64(3H,m), 7.84-7.87(2H,m).  
IR(CHCl<sub>3</sub>): 3452, 3250, 3022, 2946, 2868, 2214, 1716, 1709, 1589, 1507, 1454, 1396, 1366, 1322, 1195, 1161/cm.  
 $[\alpha]_D = +15.0^\circ$  (CHCl<sub>3</sub>, c=1.00, 24°C). mp. 129-131°C

No. 1a - 7 5  
CDCl<sub>3</sub>, 300MHz  
0.95-1.99(14H,m), 2.20(1H,m), 2.30(3H,t,J=7.2Hz), 3.02(1H,m), 3.67(3H,s), 3.94(8H,s), 4.79(1H,d,J=6.6Hz), 5.19-5.29(2H,m), 7.60-7.63(3H,m), 7.65-7.67(2H,m), 7.86-7.89(2H,m), 8.04-8.06(2H,m).  
IR(CHCl<sub>3</sub>): 3378, 3018, 2946, 2860, 1720, 1604, 1486, 1307, 1276, 1161, 1108 /cm.  
 $[\alpha]_D = +7.3^\circ$  (CHCl<sub>3</sub>, c=1.01, 25°C). mp. 132-133°C

No. 1a - 7 6  
CDCl<sub>3</sub>+CD<sub>3</sub>OD 300MHz

1.04-2.05(14H,m),2.19(1H,m),2.32(3H,t,J=6.9Hz),2.98(1H,m),5.27-5.51(3H,m),7.60-7.63(3H,m),7.65-7.69(3H,m),7.86-7.89(2H,m),8.05-8.07(3H,m).  
IR(CHCl<sub>3</sub>):3402,3299,2958,2876,2866,2849,1455,1422,1313,1281,1164 /cm.  
[α]<sub>D</sub>=-21.1° (CH<sub>3</sub>OH,c=1.03,25°C). mp.827-829(dec.)

No.1a - 7 7

CDCl<sub>3</sub>, 300MHz

0.96-1.99(14H,m),2.20(1H,m),2.80(2H,t,J=7.2Hz),3.02(1H,m),3.68(3H,s),4.38(1H,d,J=6.3Hz),5.19-5.29(2H,m),7.67-7.72(4H,m),7.89-7.91(2H,m),8.24-8.27(2H,m).

IR(CHCl<sub>3</sub>):3876,3276,3020,2946,2870,2314,1738,1594,1519,1455,1455,1389,1844,1161/cm.  
[α]<sub>D</sub>=+7.7° (CHCl<sub>3</sub>,c=1.02). mp.87-88°C

No.1a - 7 8

CDCl<sub>3</sub>, 300MHz

0.98-2.00(14H,m),2.18(1H,m),2.84(2H,t,J=7.2Hz),3.02(1H,m),5.24-5.28(2H,m),5.82(1H,d,J=5.7Hz),7.67-7.72(4H,m),7.89-7.92(2H,m),8.23-8.26(2H,m).

IR(CHCl<sub>3</sub>):3874,3280,2948,2314,1708,1595,1844,1160/cm.  
[α]<sub>D</sub>=+23.8° (CHCl<sub>3</sub>,c=1.00). mp.102-103°C.

No.1a - 7 9

CDCl<sub>3</sub>, 300MHz

0.98-2.02(14H,m),2.18(1H,m),2.86(2H,t,J=7.1Hz),3.05(1H,m),3.84(3H,s),5.18(1H,br),5.27-5.31(2H,m),6.88-6.91(2H,m),7.48-7.50(2H,m),7.60-7.63(2H,m),7.83-7.85(2H,m).

IR(CHCl<sub>3</sub>):3880,3282,3020,2950,2868,2308,1708,1589,1511,1457,1896,1221,1286,1160/cm.

[α]<sub>D</sub>=+26.7° (CHCl<sub>3</sub>,c=1.00). mp.75-77°C

No.1a - 8 0

CDCl<sub>3</sub>, 300MHz

0.96-1.99(14H,m),2.21(1H,m),2.80(2H,t,J=7.8Hz),3.02(1H,m),3.68(3H,s),4.30(1H,d,J=6.6Hz),5.19-5.28(2H,m),7.61-7.77(6H,m),7.87-7.90(3H,m),8.13(1H,m).

IR(CHCl<sub>3</sub>):3874,3270,3018,2946,2868,2316,1728,1607,1587,1527,1495,1455,1436,1344,1296,1161/cm.

[α]<sub>D</sub>=+7.4° (CHCl<sub>3</sub>,c=1.00,23°C). mp.68-70°C

No.1a - 8 1

CDCl<sub>3</sub>, 300MHz

0.97-2.01(14H,m),2.16(1H,m),2.84(2H,t,J=7.2Hz),3.01(1H,m),5.22-5.28(3H,m),7.51(1H,m),7.65(1H,m)7.70-7.76(8H,m),7.88-7.91(2H,m),8.12(1H,dd,J=6.9Hz,1.5Hz).

IR(CHCl<sub>3</sub>):3480,3352,3262,3028,2952,2872,2318,1708,1807,1587,1528,1896,1848,1225,1160/cm.

[α]<sub>D</sub>=+22.0° (CHCl<sub>3</sub>,c=1.00). mp.93-94°C

20 No.1a - 8 2

CDCl<sub>3</sub>, 300MHz

0.95-1.98(14H,m),2.20(1H,m),2.29(2H,t,J=7.3Hz),3.01(1H,m),3.67(3H,s),4.30(2H,br),4.79(1H,d,J=6.9Hz),5.20-5.29(2H,m),6.71-6.76(2H,m),7.18(1H,m),7.87(1H,dd,J=7.8,1.3Hz),7.61-7.65(2H,m),7.82-7.87(3H,m).

IR(CHCl<sub>3</sub>):3878,3020,2946,2868,2303,1725,1618,1589,1484,1454,1315,1258,1181/cm.

[α]<sub>D</sub>=+8.9° (CHCl<sub>3</sub>,c=1.00,23°C). mp.68-70°C

No.1a - 8 3

**CDCl<sub>3</sub>, 300MHz**

0.97-1.99(14H,m), 2.17(1H,m), 2.85(2H,t,J=6.9Hz), 3.00(1H,m), 5.30-5.38(2H,m), 5.87(1H,d,J=6.9Hz), 6.45(2H,br), 6.71-6.76(2H,m), 7.19(1H,dd,J=7.5,6.6Hz), 7.87(1H,m), 7.89(2H,d,J=8.4Hz), 7.95(2H,d,J=8.4Hz).  
IR(CHCl<sub>3</sub>):3478,3378,3022,2950,2868,2204,1708,1618,1569,1484,1484,1898,1816,1160/cm.  
[α]<sub>D</sub>=+17.1° (CHCl<sub>3</sub>,c=1.01).

No.1a = S 4

**CDCl<sub>3</sub>, 300MHz**

1.00-2.08(14H,m), 2.31(1H,m), 2.87(2H,t,J=6.9Hz), 3.06(1H,m), 3.86(3H,s), 5.29-5.33(2H,m), 5.45(1H,d,J=6.6Hz), 6.91-6.94(2H,m), 7.66-7.69(2H,m), 7.81(1H,d,t,J=8.1Hz), 8.04(1H,d,d,J=8.1&1.8Hz), 8.57(1H,d,J=2.1Hz).  
IR(CHCl<sub>3</sub>):3492,3254,3028,2954,2902,1708,1597,1518,1344,1291,1250/cm.  
[α]<sub>D</sub>=+27.4° (CHCl<sub>3</sub>,c=0.68,28°C).

No.1a = S 5

**CDCl<sub>3</sub>, 300MHz**

0.96-2.05(14H,m), 2.20(1H,m), 2.86(2H,t,J=6.9Hz), 2.99(1H,m), 3.84(3H,s), 5.29-5.31(2H,m), 6.89(2H,d,J=8.7Hz), 7.19(1H,brs), 7.29(1H,brs), 7.45-7.50(2H,m).  
IR(CHCl<sub>3</sub>):3478,3378,3020,2950,2868,2202,1708,1608,1511,1421,1311,1387,1248,1165/cm.  
[α]<sub>D</sub>=+17.1° (CHCl<sub>3</sub>,c=1.00,28°C).

No.1a = S 6

**CDCl<sub>3</sub>, 300MHz**

1.03-2.05(14H,m), 2.21(1H,m), 2.87(2H,t,J=6.9Hz), 3.04(1H,m), 5.29-5.38(2H,m), 5.57(1H,d,J=6.8Hz), 6.84-6.87(2H,m), 7.50-7.58(2H,m), 7.79(1H,d,J=8.1Hz), 8.08(1H,d,d,J=1.5and8.1Hz), 8.57(1H,d,J=1.5Hz).  
IR(CHCl<sub>3</sub>):3250,3034,2950,2868,2900,1707,1515,1344,1271,1168,1148/cm.  
[α]<sub>D</sub>=+31.9° (CHCl<sub>3</sub>,c=0.36,22°C).

No.1a = S 7

**CD<sub>3</sub>OD 300MHz**

1.04-2.00(14H,m), 2.18(1H,m), 2.26(2H,t,J=5.4Hz), 2.98(1H,m), 5.19-5.24(2H,m), 6.77-6.80(2H,m), 7.05(1H,d,d,J=8.1and8.1Hz), 7.22(1H,d,J=2.1Hz), 7.88-7.42(3H,m).  
IR(CHCl<sub>3</sub>):3377,2952,2878,2204,1708,1607,1515,1488,1318,1267,1222,1182/cm.  
[α]<sub>D</sub>=-15.6° (CH<sub>3</sub>OH,c=1.02,22°C).

No.1a = S 8

**CDCl<sub>3</sub>, 300MHz**

0.90-1.96(14H,m), 2.82-2.81(3H,m), 2.95(1H,m), 3.65(3H,s), 4.87(1H,d,J=8.6Hz), 5.13-5.28(2H,m), 7.46-7.62(2H,m), 7.82-7.89(4H,m), 7.90-7.96(2H,m), 8.42(1H,brs).  
IR(CHCl<sub>3</sub>):3378,3018,2946,2868,1720,1677,1692,1514,1498,1429,1376,1314,1241,1168,1094 /cm.  
[α]<sub>D</sub>= -10.7° (CHCl<sub>3</sub>,c=1.04,22.0°C)      mp.134-135°C

No.1a = S 9

**CDCl<sub>3</sub>+CD<sub>3</sub>OD 300MHz**

0.99-2.08(14H,m), 2.33(1H,m), 2.28(2H,t,J=7.2Hz), 2.89(1H,m), 5.30-5.38(2H,m), 7.46-7.82(3H,m), 7.82-7.97(2H,m).  
IR(KBr):3272,3007,2952,2874,1708,1680,1692,1527,1498,1438,1400,1317,1260,1152,1094 /cm.  
[α]<sub>D</sub>= -24.4° (CH<sub>3</sub>OH,c=1.02,25.0°C).

No.1a - 9 0

CDCl<sub>3</sub> 300MHz

0.89-1.96(14H,m),2.23-2.39(3H,m),2.92(1H,m),3.67(3H,s),4.85(1H,d,J=6.8Hz),5.10-5.25(2H,m),7.81-7.90(4H,m),8.10-8.18(2H,m),8.31-8.40(2H,m),8.77(1H,s).

IR(CHCl<sub>3</sub>):3872,3018,2946,2868,1716,1655,1592,1527,1436,1397,1346,1318,1256,1154,1099 /cm.

[α]<sub>D</sub>= -16.1° (CHCl<sub>3</sub>,c=1.00,20.0°C).

No.1a - 9 1

CDCl<sub>3</sub>+CD<sub>3</sub>OD 300MHz

0.94-2.02(14H,m),2.18-2.36(3H,m),2.87(1H,m),5.15-5.30(2H,m),7.82-7.92(4H,m),8.09-8.16(2H,m),8.30-8.37(2H,m).

IR(KBr):3284,3112,3006,2952,2874,1707,1593,1528,1498,1399,1348,1320,1259,1158,1098 /cm.

[α]<sub>D</sub>= -26.8° (CH<sub>3</sub>OH,c=1.01,22°C).

No.1a - 9 2

CDCl<sub>3</sub> 300MHz

0.88-1.85(14H,m),2.22-2.31(3H,m),2.98(1H,m),3.68(3H,s),5.07(1H,d,J=8.9Hz),5.10-5.24(2H,m),7.18(1H,m),7.85-7.48(2H,m),7.70(2H,d,J=7.8Hz),7.88-8.05(4H,m),8.60(1H,brs).

IR(CHCl<sub>3</sub>):3382,3008,2952,1730,1675,1599,1525,1499,1488,1321,1253,1161,1087 /cm.

[α]<sub>D</sub>= -16.6° (CHCl<sub>3</sub>,c=1.03,24.0°C) mp.100-101°C

No.1a - 9 3

CDCl<sub>3</sub>+CD<sub>3</sub>OD 200MHz

0.98-2.00(14H,m),2.18-2.35(3H,m),2.90(1H,m),5.15-5.30(2H,m),7.18(1H,m),7.33-7.42(2H,m),7.65-7.74(2H,m),7.80-8.08(4H,m).

IR(KBr):3247,3194,3011,2955,2878,1706,1650,1602,1544,1489,1448,1325,1285,1165,1091 /cm.

[α]<sub>D</sub>= -19.4° (CH<sub>3</sub>OH,c=1.00,24.0°C) mp.158-159°C

No.1a - 9 4

CD<sub>3</sub>OD 300MHz

1.05-2.00(14H,m),2.14(1H,m),2.28(2H,t,J=7.2Hz),2.98(1H,m),3.80(3H,s),5.18-5.27(2H,m),6.88-6.98(2H,m),7.54-7.64(2H,m),7.94-8.12(4H,m).

IR(KBr):3370,3006,2953,1708,1649,1604,1541,1512,1460,1441,1414,1328,1302,1248,1162,1107,1090,1032/cm.

[α]<sub>D</sub>= -19.1° (CH<sub>3</sub>OH,c=1.01,24°C).

No.1a - 9 5

CD<sub>3</sub>OD 300MHz

1.04-2.02(14H,m),2.14(1H,m),2.28(2H,t,J=7.2Hz),2.98-3.02(7H,m),5.18-5.27(2H,m),6.82-6.92(2H,m),7.51-7.59(2H,m),7.98-8.02(2H,m),8.04-8.11(2H,m).

IR(KBr):3370,3006,2953,1708,1649,1604,1541,1512,1460,1441,1414,1328,1302,1248,1162,1107,1090,1032/cm.

[α]<sub>D</sub>= -17.6° (CH<sub>3</sub>OH,c=1.01,24°C).

No.1a - 9 6

CD<sub>3</sub>OD 300MHz

1.05-2.02(14H,m),2.14(1H,m),2.28(2H,t,J=7.2Hz),2.98(1H,m),5.18-5.27(2H,m),6.75-6.84(2H,m),7.48-7.62(2H,m),7.94-8.12(4H,m).

IR(KBr):3389,3197,2953,2875,1707,1644,1606,1541,1514,1446,1328,1303,1259,1240,1225,1161,1091/cm.

[α]<sub>D</sub>= -18.7° (CH<sub>3</sub>OH,c=1.00,24°C). mp.198-199°C

No.1a - 9 7

d<sub>4</sub>-DMSO 300MHz

1.05-2.08(15H,m),2.15(3H,t,J=7.5Hz),2.89(1H,m),5.18-5.28(3H,m),6.78-7.12  
(3H,m),7.78(1H,d,J=1.4 Hz),7.91-7.95(3H,m),8.14(2H,d,J=8.4Hz),9.  
71(1H,s).

IR(KBr):3407,3191,2953,1711,1646,1614,1603,1587,1457,1326,1162,1151/cm.

[α]<sub>D</sub>=-20.7° (CH<sub>3</sub>OH,c=1.01,21°C).

No.1a - 9 8

CDCl<sub>3</sub> 300MHz

0.98-2.00(14H,m),2.21(1H,m),2.81(2H,t,J=7.2Hz),2.93(1H,m),3.84(3H,s),3.8  
5(5H,s),5.15-5.30(2H,m),5.45(1H,d,J=8.3Hz),7.04(2H,s),7.78-7.88(2H,m),7.9  
0-7.98(2H,m),8.58(1H,s).

IR(CHCl<sub>3</sub>):3264,3005,2954,2874,1707,1670,1607,1537,1508,1451,1421,1308,  
1158,1129,1088/cm.

[α]<sub>D</sub>= -7.2° (CHCl<sub>3</sub>,c=1.01,28.5°C). mp.147-149°C.

No.1a - 9 9

CD<sub>3</sub>OD 300MHz

1.04-1.98(14H,m),2.21(1H,m),2.10(2H,t,J=7.2Hz),2.95(1H,m),3.78(3H,s),3.8  
6(5H,s),5.07-5.24(2H,m),7.19(2H,s),7.99(2H,d,J=8.7Hz),8.13(1H,d,J=8.7Hz).

IR(KBr):3354,3002,2950,2874,1656,1607,1570,1508,1452,1418,1814,1288,1  
185,1157,1127,1092/cm.

[α]<sub>D</sub>= -20.8° (CH<sub>3</sub>OH,c=1.00,23.5°C).

No.1a - 1 0 0

CDCl<sub>3</sub> 300MHz

1.14-1.97(14H,m),2.19(1H,m),2.28(2H,t,J=7.4Hz),3.04(1H,m),3.69(3H,s),5.0  
3(1H,d,J=8.9Hz),5.15-5.29(2H,m),7.65(2H,d,J=8.4Hz),7.87(1H,s),7.98(2H,d,  
J=8.4Hz).

IR(CHCl<sub>3</sub>):3386,3271,3025,2915,2955,2877,1755,1712,1608,1331,1162/cm.

[α]<sub>D</sub>= -29.4° (CH<sub>3</sub>OH,c=1.01,25°C).

No.1a - 1 0 1

d<sub>4</sub>-DMSO

1.00-2.20(17H,m),2.84(1H,m),5.00-5.20(2H,m),7.78(2H,d,J=8.3Hz),7.84(1H,  
s),7.89-7.95(3H,m).

IR(KBr):3269,3006,2952,2874,2768,1746,1707,1607,1522,1157 /cm.

[α]<sub>D</sub>= -26.2° (CH<sub>3</sub>OH,c=1.01,25°C).

No.1a - 1 0 2

CD<sub>3</sub>OD

1.00-2.25(17H,m),2.92(1H,s),3.64(3H,s),5.07-5.21(2H,m),7.53(1H,s),7.77(2H,  
d,J=8.6Hz),7.90(2H,d,J=8.6).

IR(KBr):3420,3277,3006,2952,2873,1730,1687,1620,1571,1488,1312,1156 /cm.

[α]<sub>D</sub>= -27.3° (CH<sub>3</sub>OH,c=0.51,26°C). mp 280-282°C.

No.1a - 1 0 3

CDCl<sub>3</sub> 300MHz

0.94-1.98(14H,m),2.19(1H,m),2.28(2H,t,J=7.2Hz),3.04(1H,m),3.69(3H,s),5.1  
1(1H,d,J=8.6Hz),5.15-5.28(2H,m),7.60(2H,d,J=8.4Hz),7.87(1H,s),7.98(2H,d,  
J=8.4Hz).

IR(CHCl<sub>3</sub>):3381,3021,2955,2876,1785,1605,1487,1411,1325,1231,1177 /cm.

[α]<sub>D</sub>=+8.6° (CHCl<sub>3</sub>,c=1.00,23°C).

No.1 - 1 0 4

CDCl<sub>3</sub>, 300MHz

0.94-1.96(14H,m),2.31(1H,m),2.31(2H,t,J=8.6Hz),2.99(1H,m),5.18-5.28(3H,m),5.48(1H,d,J=8.6Hz),7.61(2H,d,J=8.7Hz),7.67(1H,s),7.99(2H,d,J=8.7Hz).  
IR(CHCl<sub>3</sub>):3382,3222,3028,3019,2957,2876,1736,1709,1604,1412,1322,1301,1286,1179,1162 /cm.  
[α]<sub>D</sub>= +10.4° (CHCl<sub>3</sub>,c=1.00,23°C).

No.1a - 1 0 5

CDCl<sub>3</sub>, 300MHz

0.92-1.98(14H,m),2.17(1H,m),2.26(2H,d,J=7.5Hz),3.01(1H,m),3.69(3H,s),4.01(3H,s),4.84(1H,d,J=6.3Hz),5.14-5.30(2H,m),7.71(2H,d,J=8.7Hz),7.87(2H,d,J=8.7Hz),8.09(1H,s).  
IR(CHCl<sub>3</sub>):3385,3284,3028,3015,2954,2877,2821,1730,1598,1459,1438,1408,1341,1160,1052 /cm.  
[α]<sub>D</sub>= +9.8° (CHCl<sub>3</sub>,c=1.00,26°C).

No.1a - 1 0 6

CDCl<sub>3</sub>, 300MHz

0.92-2.08(14H,m),2.14(1H,m),2.34(2H,d,J=7.2Hz),3.02(1H,m),4.01(3H,s),5.19(1H,d,J=6.9Hz),5.28-5.32(2H,m),7.71(2H,d,J=8.4Hz),7.88(2H,d,J=8.4Hz),8.09(1H,s).  
IR(CHCl<sub>3</sub>):3510,3384,3268,3028,3021,3014,2957,2877,2821,2667,2821,2666,1707,1598,1459,1404,1341,1324,1160,1052 /cm.  
[α]<sub>D</sub>= +11.8° (CHCl<sub>3</sub>,c=1.01,25°C). mp 95-96°C

No.1a - 1 0 7

CDCl<sub>3</sub>, 300MHz

0.93-1.97(14H,m),1.84(8H,t,J=7.2Hz),2.18(1H,m),2.28(2H,d,J=7.4Hz),3.01(1H,m),3.65(3H,s),4.36(2H,q,J=7.3Hz),4.88(1H,d,J=6.6Hz),5.15-5.39(2H,m),7.71(2H,d,J=8.7Hz),7.87(3H,d,J=8.7Hz),8.09(1H,s).  
IR(CHCl<sub>3</sub>):2388,2282,2025,2026,2015,2054,2077,1729,1599,1480,1458,1408,  
1403,1398,1161 /cm.  
[α]<sub>D</sub>=+4.4° (CHCl<sub>3</sub>,c=1.00,25°C).

No.1a - 1 0 8  
CDCl<sub>3</sub>, 300MHz  
0.90-2.04(14H,m),1.84(8H,t,J=7.2Hz),2.14(1H,m),2.84(2H,d,J=7.1Hz),3.01(1H,m),4.27(2H,q,J=7.3Hz),5.20(1H,d,J=6.6Hz),5.21-5.35(2H,m),7.71(3H,d,J=8.4Hz),7.88(2H,d,J=8.4Hz),8.10(1H,s).  
IR(CHCl<sub>3</sub>):3514,2984,2970,2025,2015,2018,2057,2077,1708,1599,1458,1408,  
1824,1824,1160,1050 /cm.  
[α]<sub>D</sub>= +12.7° (CHCl<sub>3</sub>,c=1.00,25°C).

No.1a - 1 0 9  
[α]<sub>D</sub>=+8.5° (CHCl<sub>3</sub>,c=1.00,25°C). mp 109.0-111.0°C

No.1a - 1 1 0  
CDCl<sub>3</sub>;CD<sub>3</sub>OD(95:5)  
0.92-2.06(14H,m),2.20(1H,m),2.30(2H,d,J=7.2Hz),2.99(1H,m),5.22-5.38(2H,m),7.54-7.66(3H,m),8.07(2H,d,J=9.0Hz),8.12-8.20(2H,m),8.29(2H,d,J=9.0Hz).  
IR(Nujol):2270,2956,2924,2954,1716,1648,1488,1319,1167/cm.  
[α]<sub>D</sub>=+17.0° (CHCl<sub>3</sub>,c=1.00,25°C). mp.166.5-168°C

No.1a - 1 1 1  
[α]<sub>D</sub>=+2.6° (CHCl<sub>3</sub>,c=1.00,24°C). mp 120.0-121.0°C

No.1a - 1 1 2  
CDCl<sub>3</sub>, 300MHz  
0.96-2.04(14H,m),2.19(1H,m),2.38(2H,d,J=7.1Hz),3.07(1H,m),5.38-5.81(2H,m),5.88(1H,d,J=6.6Hz),7.54-7.68(3H,m),8.05(2H,d,J=8.4Hz),8.18-8.28(2H,m),8.41(2H,d,J=8.4Hz).  
IR(CHCl<sub>3</sub>):2384,2282,2025,2015,2057,2077,1708,1598,1496,1457,1417,1326,  
1164 /cm.  
[α]<sub>D</sub>= +12.2° (CHCl<sub>3</sub>,c=1.00,24°C). mp.163-164°C

No.1a - 1 1 3  
[α]<sub>D</sub>= +22.1° (CHCl<sub>3</sub>,c=1.05,25°C). mp.80-92°C

No.1a - 1 1 4  
[α]<sub>D</sub>= +2.2° (CHCl<sub>3</sub>,c=1.02,25°C).

No.1a - 1 1 5  
CDCl<sub>3</sub>, 300MHz  
0.90-1.98(14H,m),2.16-2.22(1H,m),2.27(2H,t,J=7.3Hz),2.95-3.04(1H,m),3.68(3H,s),4.04(2H,s),4.88(1H,d,J=6.6Hz),5.10-5.27(2H,m),7.12-7.34(7H,m),7.76-7.82(2H,m).  
IR(CHCl<sub>3</sub>):2384,2026,2052,1727,1595,1498,1486,1318,1165,1091,890/cm.  
[α]<sub>D</sub>=0°  
[α]<sub>D</sub>=+4.9±0.4°(CHCl<sub>3</sub>,c=1.05,25°C)

No.1a - 1 1 6  
CDCl<sub>3</sub>, 300MHz  
0.90-2.10(14H,m),2.10-2.18(1H,m),2.32(2H,t,J=7.2Hz),2.96-3.04(1H,m),

4.04(2H,s),5.14(1H,d,J=8.8Hz),5.18-5.23(2H,m),7.12-7.34(7H,m),7.76-

7.82(2H,m).

IR(CHCl<sub>3</sub>):3260,3030,2950,1709,1407,1318,1154,1091,892/cm.

[α]<sub>D</sub>=+9.1±0.5°(CHCl<sub>3</sub>,c=1.04,23°C)

No.1a - 1 1 7

CD<sub>3</sub>OD 300MHz

0.96-2.18(17H,m),2.89-2.92(1H,m),4.06(2H,s),4.95-5.23(2H,m),7.15-

7.42(7H,m),7.75-7.81(2H,m).

IR(KBr):3429,3279,2951,2872,1662,1494,1458,1409,1318,1155,1093,1057/cm.

m.

[α]<sub>D</sub>=-16.3±0.5°(CH<sub>3</sub>OH,c=1.06,23°C)

No.1a - 1 1 8

CDCl<sub>3</sub> 300MHz

0.95-1.70(18H,m),1.80-2.00(6H,m),2.20-2.40(3H,m),2.98(1H,m),4.06(2H,s),4.

72(1H,d,J=8.8Hz),5.00-5.23(3H,m),7.18(2H,d,J=8.4Hz),7.26-7.88(5H,m),7.7

9(3H,d,J=8.1Hz).

IR(CHCl<sub>3</sub>):3376,3020,2948,2868,1716,1596,1492,1458,1407,1318,1155,1103/cm.

m.

[α]<sub>D</sub>=+2.4°(CHCl<sub>3</sub>,c=1.06,23°C).

No.1a - 1 1 9

CDCl<sub>3</sub> 300MHz

0.90-2.02(14H,m),2.20(1H,m),2.29(2H,t,J=7.2Hz),3.00(1H,m),3.68(3H,s),4.8

6(1H,d,J=8.9Hz),5.18-5.84(2H,m),7.00-7.09(4H,m),7.32(1H,m),7.37-7.45(2H,

m),7.79-7.86(2H,m).

IR(CHCl<sub>3</sub>):3376,3018,2946,2868,1737,1582,1486,1321,1248,1151,1093/cm.

[α]<sub>D</sub>= +4.5°(CHCl<sub>3</sub>,c=1.06,23.5°C).

No.1a - 1 2 0

CD<sub>3</sub>OD 300MHz

1.00-2.00(14H,m),2.18(2H,t,J=7.6Hz),2.16(1H,m),2.91(1H,m),5.05-5.35(2H,

m),7.04-7.11(4H,m),7.18-7.25(1H,m),7.35-7.48(2H,m),7.80-7.87(2H,m).

IR(KBr):3430,3279,3006,2952,2878,1662,1486,1409,1321,1296,1246,1152,1

095/cm.

[α]<sub>D</sub>= -8.8°(CH<sub>3</sub>OH,c=1.06,23.0°C).

No.1a - 1 2 1

CDCl<sub>3</sub> 300MHz

0.90-2.10(14H,m),2.15(1H,m),2.85(2H,t,J=7.2Hz),3.01(1H,m),5.20(1H,d,J=6.

9Hz),5.23-5.35(2H,m),7.00-7.09(4H,m),7.18-7.25(1H,m),7.37-7.45(2H,m),7.7

9-7.88(2H,m).

IR(CHCl<sub>3</sub>):3360,3020,2945,2868,1708,1582,1486,1409,1321,1296,1248,1151,

1093/cm.

[α]<sub>D</sub>= +15.1°(CHCl<sub>3</sub>,c=1.04,24.0°C).

No.1a - 1 2 2

CDCl<sub>3</sub> 300MHz

0.90-2.00(14H,m),2.28(1H,m),2.28(2H,t,J=7.6Hz),2.96(1H,m),3.67(3H,s),4.6

9(1H,d,J=8.6Hz),5.15-5.82(2H,m),6.22(1H,s),6.98-7.40(5H,m),7.80-7.38(2H,

m),7.68-7.74(2H,m).

IR(CHCl<sub>3</sub>):3416,3270,3018,2946,2868,1725,1587,1508,1487,1400,1320,1149,

1094/cm.

[α]<sub>D</sub>= +6.2°(CHCl<sub>3</sub>,c=1.04,23.0°C).

No.1a - 1 2 3

CDCl<sub>3</sub> 300MHz

0.90-2.04(1H,m),2.18(1H,m),2.23(2H,t,J=7.2Hz),2.38(1H,m),5.04-5.35(8H,m),6.98-7.12(8H,m),7.13-7.20(2H,m),7.28-7.36(2H,m),7.66-7.74(2H,m).  
IR(CHCl<sub>3</sub>):3424,3378,3028,2952,2874,1708,1687,1508,1448,1390,1220,1148,1092 /cm.  
[α]<sub>D</sub>= +20.9° (CHCl<sub>3</sub>,c=1.06,23.0°C).

No.1a - 1 2 4  
CDCl<sub>3</sub>, 300MHz  
0.90-2.00(14H,m),2.18(1H,m),2.23(2H,t,J=7.2Hz),2.38(3H,s),3.00(1H,m),3.14(3H,s),3.58(3H,s),4.55(2H,s),4.84(1H,d,J=6.8Hz),5.10-5.29(2H,m),7.16-7.28(4H,m),7.26-7.34(2H,m),7.78-7.84(2H,m).  
IR(CHCl<sub>3</sub>):3384,3028,2952,2874,1727,1698,1501,1485,1410,1370,1329,1173,1148,1091 /cm.  
[α]<sub>D</sub>= +2.7° (CHCl<sub>3</sub>,c=1.09,23.0°C).

No.1a - 1 2 5  
CDCl<sub>3</sub>, 300MHz  
0.90-2.00(14H,m),2.18(1H,m),2.28(2H,t,J=7.2Hz),2.29(3H,s),3.00(1H,m),3.68(3H,s),4.04(2H,s),4.80(1H,d,J=6.6Hz),5.11-5.29(2H,m),6.98-7.06(2H,m),7.12-7.19(2H,m),7.81(2H,d,J=8.1Hz),7.79(2H,d,J=8.1Hz).  
IR(CHCl<sub>3</sub>):3382,3280,3024,2950,2874,1780,1596,1504,1485,1407,1367,1318,1196,1155,1091 /cm.  
[α]<sub>D</sub>= +2.9° (CHCl<sub>3</sub>,c=1.06,23.0°C).

No.1a - 1 2 6  
CDCl<sub>3</sub>, 300MHz  
0.90-2.02(14H,m),2.14(1H,m),2.29(3H,s),2.32(3H,t,J=7.2Hz),3.01(1H,m),4.08(2H,s),5.10(1H,d,J=6.6Hz),5.15-5.80(2H,m),6.98-7.06(2H,m),7.11-7.18(2H,m),7.80(2H,d,J=8.1Hz),7.79(2H,d,J=8.1Hz).  
IR(CHCl<sub>3</sub>):3374,3380,3020,2948,2868,1749,1708,1596,1504,1407,1389,1317,1195,1155,1091 /cm.  
[α]<sub>D</sub>= +10.0° (CHCl<sub>3</sub>,c=1.09,23.0°C).

No.1a - 1 2 7  
CDCl<sub>3</sub>, 300MHz  
0.87-1.95(14H,m),2.18-2.82(8H,m),2.95(1H,m),3.69(3H,s),3.96(2H,s),4.79(1H,d,J=6.6Hz),4.97-5.17(2H,m),5.54(1H,s),6.75-6.89(2H,m),6.97-7.05(2H,m),7.25-7.38(2H,m),7.75-7.81(2H,m).  
IR(CHCl<sub>3</sub>):3382,3026,2950,2874,1722,1595,1511,1436,1407,1317,1257,1154,1090 /cm.  
[α]<sub>D</sub>= -2.1° (CHCl<sub>3</sub>,c=1.00,21.5°C).

No.1a - 1 2 8  
CDCl<sub>3</sub>, 300MHz  
0.85-2.02(14H,m),2.18(1H,m),2.31(2H,t,J=7.2Hz),2.96(1H,m),3.95(2H,s),5.05-5.27(8H,m),6.79-6.82(2H,m),6.96-7.04(2H,m),7.25-7.38(2H,m),7.74-7.81(2H,m).  
IR(CHCl<sub>3</sub>):3368,3020,2948,2868,1708,1596,1511,1407,1315,1242,1154,1091 /cm.  
[α]<sub>D</sub>= +4.8° (CHCl<sub>3</sub>,c=1.04,22°C).

No.1a - 1 2 9  
CDCl<sub>3</sub>, 300MHz  
0.89-1.98(14H,m),2.18(1H,m),2.37(2H,t,J=7.2Hz),2.98(1H,m),3.68(3H,s),3.79(3H,s),3.98(3H,s),4.81(1H,d,J=6.6Hz),5.10-5.37(2H,m),6.81-6.87(2H,m),7.03-7.10(2H,m),7.25-7.32(2H,m),7.75-7.82(2H,m).  
IR(CHCl<sub>3</sub>):3382,3278,3008,2950,2874,1726,1609,1509,1457,1436,1407,1315,1244,1154,1091,1088/cm.

$[\alpha]_D = +19.8^\circ$  (CHCl<sub>3</sub>, c=1.05, 22°C).

No.1a - 1 3 0

CDCl<sub>3</sub>, 300MHz

0.90-2.00(14H,m), 2.20(1H,m), 2.80(2H,t,J=7.2Hz), 2.98(1H,m), 3.69(3H,s), 4.81(1H,d,J=8.6Hz), 5.12-5.82(2H,m), 5.46(1H,bs), 6.84-7.01(6H,m), 7.76-7.88(3H,m)  
IR(CHCl<sub>3</sub>): 3880, 3284, 3024, 2952, 2874, 1724, 1588, 1504, 1488, 1488, 1488, 1396, 1148, 1091/cm.  
 $[\alpha]_D = +28.9^\circ$  (CHCl<sub>3</sub>, c=1.01, 22°C).

No.1a - 1 3 1

CDCl<sub>3</sub>, 300MHz

0.92-2.10(14H,m), 2.18(1H,m), 2.84(2H,t,J=6.8Hz), 2.98(1H,m), 3.18-3.88(3H,m), 4.82(1H,d,J=8.6Hz), 5.14-5.88(2H,m), 6.84-7.01(6H,m), 7.76-7.88(2H,m).  
IR(CHCl<sub>3</sub>): 3270, 3028, 2952, 2874, 1708, 1589, 1505, 1489, 1456, 1322, 1297, 1288, 1148, 1091/cm.

$[\alpha]_D = +7.7^\circ$  (CHCl<sub>3</sub>, c=1.09, 24°C).

No.1a - 1 3 2

CDCl<sub>3</sub>, 300MHz

0.91-2.02(14H,m), 2.19(1H,m), 2.89(2H,t,J=7.2Hz), 2.99(1H,m), 3.68(3H,s), 3.88(3H,s), 4.82(1H,d,J=8.6Hz), 5.14-5.88(2H,m), 6.80-7.04(6H,m), 7.76-7.88(2H,m).  
IR(CHCl<sub>3</sub>): 3284, 3006, 2952, 2874, 1727, 1589, 1502, 1488, 1459, 1488, 1396, 1281, 1150, 1082, 1039/cm.  
 $[\alpha]_D = +3.1^\circ$  (CHCl<sub>3</sub>, c=1.01, 22°C).

No.1a - 1 3 3

TLC Rf=0.21 (에틸아세테이트/n-헥산 = 1:1 (0.8% v/v 포신, ))

No.1a - 1 3 4

CDCl<sub>3</sub>, 300MHz

0.97-2.10(14H,m), 2.20(1H,m), 2.86(2H,t,J=6.8Hz), 3.04(1H,m), 3.23-3.33(2H,m), 5.41(1H,d,J=8.6Hz), 7.02(1H,d,J=9.0Hz), 7.09-7.18(2H,m), 7.26-7.32(1H,m), 7.43-7.49(2H,m), 7.93(1H,d,d,J=2.4 & 9.0Hz), 8.46(1H,d,J=2.4Hz).  
IR(CHCl<sub>3</sub>): 3284, 3270, 3020, 2958, 1708, 1610, 1687, 1537, 1479, 1352, 1271, 1252, 1167/cm.  
 $[\alpha]_D = +20.9^\circ$  (CHCl<sub>3</sub>, c=0.51, 22°C).

No.1a - 1 3 5

CDCl<sub>3</sub>, 300MHz

0.96-2.03(14H,m), 2.21(1H,m), 2.29(2H,t,J=7.2Hz), 3.07(1H,m), 3.68(3H,s), 5.04(1H,d,J=8.6Hz), 5.16-5.83(2H,m), 7.48-7.55(2H,m), 7.64(1H,m), 7.76-7.82(2H,m), 7.88-7.94(2H,m), 7.88-8.04(2H,m).  
IR(CHCl<sub>3</sub>): 3284, 3282, 3026, 2952, 2874, 1727, 1663, 1598, 1448, 1398, 1318, 1274, 1163, 1090 /cm.

$[\alpha]_D = +3.1^\circ$  (CHCl<sub>3</sub>, c=1.03, 22.0°C).

No.1a - 1 3 6

CDCl<sub>3</sub>, 300MHz

0.95-2.05(14H,m), 2.19(1H,m), 2.34(2H,t,J=7.2Hz), 3.08(1H,m), 3.10-3.40(3H,m), 3.85(1H,d,J=8.6Hz), 7.45-7.58(2H,m), 7.64(1H,m), 7.74-7.84(2H,m), 7.84-7.96(2H,m), 7.95-8.06(2H,m).

IR(CHCl<sub>3</sub>): 3260, 3018, 2950, 2870, 1708, 1662, 1598, 1446, 1398, 1318, 1274, 1162, 1090 /cm.

$[\alpha]_D = +12.9^\circ$  (CHCl<sub>3</sub>, c=1.05, 21.5°C).

No.1a - 1 3 7

CDCl<sub>3</sub>, 300MHz

0.97-2.04(14H,m),2.27(1H,m),2.31(2H,t,J=7.2Hz),2.07(1H,m),2.70(3H,s),5.1  
5-5.30(3H,m),7.48-7.68(5H,m),7.98-8.02(2H,m).

IR(CHCl<sub>3</sub>):3382,3050,2953,2875,1725,1446,1328,1154,1098 /cm.  
[α]<sub>D</sub>= -15.1° (CHCl<sub>3</sub>,c=1.03,22.0°C).

No.1a - 1 3 8

CDCl<sub>3</sub>, 300MHz

0.95-2.04(14H,m),2.25(1H,m),2.35(2H,t,J=7.2Hz),2.08(1H,m),5.15-5.34(3H,  
m),5.41(1H,d,J=8.6Hz),7.48-7.68(5H,m),7.98-8.03(2H,m).

IR(CHCl<sub>3</sub>):3370,3243,3022,2950,2870,1707,1445,1408,1328,1154,1099 /cm.  
[α]<sub>D</sub>= -0.6° (CHCl<sub>3</sub>,c=1.06,21.6°C) [α]<sub>DH</sub>= +80.7° (CHCl<sub>3</sub>,c=1.06,21.6°C).

No.1a - 1 3 9

CDCl<sub>3</sub>, 300MHz

0.92-2.19(14H,m),2.27-2.34(3H,m),2.28(1H,m),2.65(3H,s),4.28(2H,s),4.87(1  
H,d,J=7.4Hz),5.34-5.50(3H,m),7.37-7.62(9H,m).

IR(CHCl<sub>3</sub>):3389,3294,3028,2915,2954,2877,1730,1600,1488,1325,1151,1129  
/cm.

[α]<sub>D</sub>= -24.8° (CHCl<sub>3</sub>,c=1.01,24°C).

No.1a - 1 4 0

CDCl<sub>3</sub>, 300MHz

0.92-2.32(15H,m),2.34(2H,t,J=7.1Hz),2.24(1H,m),4.29(2H,s),4.81(1H,d,J=7,  
4Hz),5.38-5.52(2H,m),7.36-7.62(9H,m).

IR(CHCl<sub>3</sub>):3510,3388,3251,3031,3015,2956,2877,2868,1708,1601,1488,1318,  
1151,1129 /cm.

[α]<sub>D</sub>= -24.8° (CHCl<sub>3</sub>,c=1.02,25°C).

No.1a - 1 4 1

CDCl<sub>3</sub> 800MHz

0.92-2.19(15H,m), 2.82(2H,t,J=7.2Hz), 3.26(1H,m), 3.66(3H,s), 4.31(2H,s), 4.48  
(1H,d,J=7.4Hz), 5.33-5.49(3H,m), 7.42-7.80(5H,m).

IR(CHCl<sub>3</sub>):3388,3285,3018,2958,2877,2225,1730,1697,1478,1320,1152,1129  
/cm.

[α]<sub>D</sub>= -20.1° (CHCl<sub>3</sub>,c=0.98,25°C).

No.1a - 1 4 2

CDCl<sub>3</sub> 800MHz

0.92-2.22(15H,m), 2.85(2H,t,J=6.8Hz), 3.26(1H,m), 4.32(2H,s), 4.66(1H,d,J=7.  
4Hz), 5.33-5.58(2H,m), 7.48-7.80(5H,m).

IR(CHCl<sub>3</sub>):3512,3388,3258,3031,3028,3014,2958 2877,2225,1708,1697,147  
9,1319,1151,1128 /cm.

[α]<sub>D</sub>= -19.8° (CHCl<sub>3</sub>,c=1.08,23°C).

No.1a - 1 4 3

CDCl<sub>3</sub> 800MHz

1.00-1.93(14H,m), 2.17(1H,m), 2.37(2H,t,J=7.2Hz), 3.07(1H,m), 5.17-5.32(2H,  
m), 5.36(1H,d,J=6.9Hz), 7.77(1H,d,J=9.0Hz), 8.11-8.17(3H,m), 8.36(1H,d,d,J=  
2.1 & 9.0Hz), 8.51(1H,d,J=1.8Hz), 8.66(1H,d,J=2.1Hz).

IR(CHCl<sub>3</sub>):3382,3266,3026,2954,2874,1708,1682,1685,1528,1458,1419,1345,  
1158/cm.

[α]<sub>D</sub>=+7.6° (CHCl<sub>3</sub>,c=1.04,22°C).

No.1a - 1 4 4

CDCl<sub>3</sub> 800MHz

0.85-1.90(14H,m), 2.17(1H,m), 2.25(2H,t,J=7.5Hz), 3.02(1H,m), 5.09(1H,d,J=6.

8.15-6.21(2H,m),6.72(1H,d,J=8.4Hz),8.85(1H,s),7.54(1H,d,J=8.4Hz),7.72(1H,d,J=9.0Hz),7.83(1H,d,d,J=1.8  $\pm$  9.0Hz),8.82(1H,d,J=1.8Hz).  
 IR(CHCl<sub>3</sub>):8880,8260,8020,2948,2868,2352,1709,1688,1460,1428,1318,1291,1265,1148,1120/cm.  
 [α]<sub>D</sub>=+12.9° (CHCl<sub>3</sub>,c=1.02,23°C).

No.1a - 1 4 5

CDCl<sub>3</sub>, 300MHz  
 0.97-1.90(14H,m),2.18(1H,m),2.27(2H,t,J=6.8Hz),8.03(1H,m),8.08(8H,s),5.12(1H,d,J=8.8Hz),5.19-5.25(2H,m),6.78-6.84(2H,m),7.53(1H,d,J=8.7Hz),7.76-7.83(2H,m),8.30(1H,d,J=1.8Hz).  
 IR(CHCl<sub>3</sub>):8272,3030,2950,2874,1708,1688,1601,1511,1457,1428,1357,1328,1151,1124/cm.  
 [α]<sub>D</sub>=+6.8° (CHCl<sub>3</sub>,c=1.04,23°C).

No.1a - 1 4 6

CDCl<sub>3</sub>, 300MHz  
 0.95-2.00(14H,m),2.16(1H,m),2.29(2H,t,J=7.2Hz),8.05(1H,m),4.10(3H,s),5.13-5.28(2H,m),5.88(1H,d,J=8.9Hz),7.67-7.74(2H,m),8.08(1H,d,d,J=1.8  $\pm$  9.0Hz),8.11(1H,s),8.61(1H,d,J=1.8Hz).  
 IR(CHCl<sub>3</sub>):8260,8020,2948,2868,1708,1689,1606,1528,1470,1455,1424,1349,1311,1288,1174,1148,1120,1079,1060,1022/cm.  
 [α]<sub>D</sub>=+7.8° (CHCl<sub>3</sub>,c=1.00,23°C).

No.1a - 1 4 7

CDCl<sub>3</sub>, 300MHz  
 0.92-1.92(14H,m),2.17(1H,m),2.26(2H,t,J=7.2Hz),8.01(1H,m),8.97(8H,s),5.10-5.27(5H,m),6.92(1H,s),7.29(1H,s),7.52(1H,d,J=8.7Hz),7.82(1H,d,d,J=2.1  $\pm$  8.7Hz),8.88(1H,d,J=2.1Hz).  
 IR(CHCl<sub>3</sub>):8880,8264,8002,2950,2868,1708,1694,1478,1452,1428,1317,1284,1218,1168,1147,1115,1088,1031/cm.  
 [α]<sub>D</sub>=+5.8° (CHCl<sub>3</sub>,c=1.02,23°C).

No.1a - 1 4 8

CDCl<sub>3</sub>, 300MHz  
 0.90-1.98(14H,m),2.15(1H,m),2.28(2H,t,J=6.8Hz),2.91(6H,s),8.03(1H,m),4.01(3H,s),5.15-5.26(3H,m),7.10(1H,s),7.88(1H,s),7.89(1H,d,J=8.7Hz),7.87(1H,d,J=2.1  $\pm$  8.7Hz),8.40(1H,d,J=2.1Hz).  
 IR(CHCl<sub>3</sub>):8284,8268,2958,1709,1682,1602,1495,1478,1458,1480,1317,1281,1148,1121/cm.  
 [α]<sub>D</sub>=+11.2° (CHCl<sub>3</sub>,c=1.01,23°C).

No.1a - 1 4 9

CDCl<sub>3</sub>, 300MHz  
 0.99-1.90(14H,m),2.17(1H,m),2.28(2H,t,J=7.2Hz),8.00(1H,m),6.13-6.19(2H,m),5.48(1H,d,J=8.0Hz),7.02(1H,d,d,J=2.4  $\pm$  9.0Hz),7.88-7.41(2H,m),7.58(1H,d,J=8.7Hz),7.96(1H,d,d,J=1.8  $\pm$  8.7Hz),8.45(1H,d,J=1.8Hz).  
 IR(CHCl<sub>3</sub>):8270,8020,2948,2868,1709,1601,1478,1448,1419,1318,1147,1120/cm.  
 [α]<sub>D</sub>=-11.4° (CHCl<sub>3</sub>,c=1.01,23°C).

No.1a - 1 5 0

CDCl<sub>3</sub>, 300MHz  
 0.97-1.88(14H,m),2.12-2.31(2H,m),2.38(3H,s),8.01(1H,m),5.14-5.19(2H,m),5.36(1H,d,J=6.6Hz),7.34(1H,d,d,J=2.4  $\pm$  9.0Hz),7.59(1H,d,J=6.3Hz),7.68(1H,d,J=8.7Hz),7.72(1H,d,J=2.4Hz),8.01(1H,d,d,J=1.8  $\pm$  8.7Hz),8.49(1H,d,J=1.8Hz).  
 IR(CHCl<sub>3</sub>):8470,8274,8260,8016,2950,2868,1709,1474,1444,1412,1370,1318,

1986,1168,1148,1118/cm.  
[ $\alpha$ ]<sub>D</sub>=+4.9° (CHCl<sub>3</sub>,c=1.00,24°C).

No.1a - 1 5 1  
CDCl<sub>3</sub>, 800MHz  
0.97-1.89(14H,m),2.17(1H,m),2.35(2H,t,J=7.2Hz),3.03(1H,m),3.92(3H,s),5.1  
5-6.80(2H,m),6.82(1H,d,J=6.6Hz),7.11(1H,d,d,J=2.4 & 9.3Hz),7.45(1H,d,J=2.4Hz),7.50(1H,d,J=9.3Hz),7.62(1H,d,J=8.7Hz),7.97(1H,d,d,J=2.1 & 8.7Hz),  
8.50(1H,d,J=2.1Hz).  
IR(CHCl<sub>3</sub>):3280,3018,2948,1708,1488,1464,1432,1314,1287,1268,1188,1169,  
1147/cm.  
[ $\alpha$ ]<sub>D</sub>=+4.9° (CHCl<sub>3</sub>,c=1.01,28.5°C).

No.1a - 1 5 2  
CDCl<sub>3</sub>, 800MHz  
0.98-2.04(14H,m),2.15(1H,m),2.30(2H,t,J=8.6Hz),3.04(1H,m),3.17-3.29(3H,m),  
7.41(1H,d,d,J=1.5 & 8.1Hz),7.64-7.88(3H,m),7.92(1H,d,J=8.4Hz),8.00(1H,d,d,J=1.8 & 8.4Hz),8.49(1H,d,J=1.8Hz).  
IR(CHCl<sub>3</sub>):3268,3028,2952,2872,1707,1629,1591,1486,1416,1318,1275,1180/cm.  
[ $\alpha$ ]<sub>D</sub>=+8.2° (CHCl<sub>3</sub>,c=1.04,23°C).

No.1a - 1 5 3  
CDCl<sub>3</sub>, 800MHz  
0.97-1.88(14H,m),2.16(1H,m),2.26(2H,t,J=7.2Hz),3.03(1H,m),4.84-4.85(2H,m),  
5.16-6.80(5H,m),6.18(1H,m),7.14(1H,d,d,J=2.7 & 9.0Hz),7.46-7.52(2H,m),  
7.68(1H,d,J=8.7Hz),7.97(1H,d,d,J=1.8 & 8.7Hz),8.49(1H,d,J=1.8Hz).  
IR(CHCl<sub>3</sub>):3374,3260,3020,2948,2868,1708,1599,1478,1446,1414,1314,1284,  
1268,1184,1148,1120/cm.  
[ $\alpha$ ]<sub>D</sub>=+5.8° (CHCl<sub>3</sub>,c=1.00,28°C).

No.1a - 1 5 4  
CDCl<sub>3</sub>, 800MHz  
0.99-2.00(15H,m),2.26(2H,t,J=7.2Hz),3.03(1H,m),4.07(3H,s),5.28-5.37(2H,m)  
,5.86(1H,d,J=7.3Hz),7.20(1H,s),7.36-7.48(3H,m),7.55-7.68(1H,m),7.81-7.98  
(1H,m),8.52(1H,s).  
IR(CHCl<sub>3</sub>):3262,3257,3020,2948,2868,1708,1687,1602,1579,1488,1467,1487,  
1418,1345,1318,1301,1276,1182,1104/cm.  
[ $\alpha$ ]<sub>D</sub>= +19.4° (CHCl<sub>3</sub>,c=1.01,35°C).  
mp.88-90°C

No.1a - 1 5 5  
CDCl<sub>3</sub>, 800MHz  
0.92-2.02(14H,m),2.16(1H,m),2.81(2H,t,J=7.2Hz),3.01(1H,m),4.10(3H,s),5.1  
0(1H,d,J=6.6Hz),5.18-5.35(2H,m),7.04-7.26(5H,m),7.67-7.76(2H,m).  
IR(CHCl<sub>3</sub>):3268,3028,2952,2952,2872,1708,1599,1574,1478,1457,1418,1301,  
1268,1147,1124,1101,1080/cm.  
[ $\alpha$ ]<sub>D</sub>= +33.4° (CHCl<sub>3</sub>,c=1.00,28°C).

No.1a - 1 5 6  
CDCl<sub>3</sub>, 800MHz  
0.91-2.21(16H,m),2.33(2H,t,J=6.9Hz),3.01(1H,m),5.11(1H,d,J=6.6Hz),5.27-5.  
85(2H,m),5.85-6.96(5H,m),7.35(1H,d,J=2.1Hz),7.42(1H,d,d,J=2.1 & 8.7Hz).  
IR(CHCl<sub>3</sub>):3384,3268,2957,1708,1587,1489,1468,1416,1290,1222,1151,1128/  
cm.  
[ $\alpha$ ]<sub>D</sub>=+6.4° (CHCl<sub>3</sub>,c=1.00,28°C).

No.1a - 1 5 7

**CDCl<sub>3</sub>, 300MHz**  
**0.97-1.91(1H,m),2.18(1H,m),2.28(2H,t,J=6.9Hz),3.04(1H,m),5.18-5.38(3H,m),7.52-7.58(2H,m),7.88-8.00(3H,m),8.25(1H,m),8.69(1H,m).**  
**IR(CHCl<sub>3</sub>):3383,3388,2952,2874,1707,1457,1425,1409,1318,1152/cm.**  
**[α]<sub>D</sub>=+4.4° (CHCl<sub>3</sub>,C=1.02,22°C).**

**No.1a - 1 5 8**  
**CDCl<sub>3</sub>, 300MHz**  
**1.02-1.97(1H,m),2.30(1H,m),2.29(2H,t,J=7.2Hz),3.06(1H,m),5.19-5.24(2H,m),5.58(1H,d,J=6.6Hz),7.63(1H,m),7.73(1H,m),7.88-7.91(2H,m),7.96(1H,d,J=7.8Hz),8.04(1H,d,d,J=1.6 & 1.1Hz),8.34(1H,d,J=1.2Hz).**  
**IR(CHCl<sub>3</sub>):3490,3280,3020,2950,2870,1707,1456,1399,1312,1155/cm.**  
**[α]<sub>D</sub>=-8.5° (CHCl<sub>3</sub>,C=1.00,22°C).**

**No.1a - 1 5 9**  
**CDCl<sub>3</sub>, 300MHz**  
**0.92-1.88(1H,m),2.18(1H,m),2.24(2H,m),3.02(1H,m),3.90(3H,s),5.13-5.28(3H,m),7.29-7.58(4H,m),7.97(1H,d,d,J=1.8 & 7.8Hz),8.18(1H,d,J=7.5Hz),8.34(1H,d,J=1.8Hz).**  
**IR(CHCl<sub>3</sub>):3382,3286,3018,2956,1708,1629,1584,1476,1467,1395,1245,1227,1158,1146/cm.**  
**[α]<sub>D</sub>=+14.8° (CHCl<sub>3</sub>,C=1.00,22°C).**

**No.1a - 1 6 0**  
**CDCl<sub>3</sub>, 300MHz**  
**0.93-1.88(1H,m),2.18-2.24(3H,m),3.00(1H,m),5.08-5.21(3H,m),7.28-7.33(1H,m),7.47-7.51(8H,m),7.90(1H,d,d,J=1.6 & 7.8Hz),8.10(1H,d,J=7.8Hz),8.38-8.64(3H,m).**  
**IR(CHCl<sub>3</sub>):3455,3380,3275,3020,2957,2876,1708,1627,1604,1495,1473,1457,1828,1240,1222,1158,1146/cm.**  
**[α]<sub>D</sub>=+8.2° (CHCl<sub>3</sub>,C=1.01,22°C).**

**No.1a - 1 6 1**  
**CDCl<sub>3</sub>, 300MHz**  
**0.98-1.88(14H,m),2.17(1H,m),2.24(2H,t,J=7.2Hz),3.05(1H,m),5.16-5.20(2H,m),5.35(1H,d,J=6.6Hz),7.40(1H,m),7.55(1H,m),7.68(1H,d,J=8.1Hz),7.89(1H,d,d,J=1.6 & 8.1Hz),8.01(1H,m),8.06(1H,d,J=8.1Hz),8.12(1H,d,J=1.5Hz).**  
**IR(CHCl<sub>3</sub>):3478,3286,3028,2952,2874,1708,1454,1417,1323,1196,1145/cm.**  
**[α]<sub>D</sub>=+21.9° (CHCl<sub>3</sub>,C=1.01,22°C).**

**No.1a - 1 6 2**  
**CDCl<sub>3</sub>, 300MHz**  
**0.96-1.98(14H,m),2.02(1H,m),2.25(3H,t,J=7.2Hz),3.06(1H,m),4.10(3H,s),5.14-5.26(2H,m),5.41(1H,d,J=7.2Hz),7.35-7.42(1H,m),7.51-7.64(3H,m),7.94-8.00(1H,m),8.16(1H,s).**  
**IR(CHCl<sub>3</sub>):3368,3274,3028,2952,2874,1708,1688,1583,1468,1452,1485,1418,1315,1151,1103,1088,1024/cm.**  
**[α]<sub>D</sub>= +15.1° (CHCl<sub>3</sub>,C=1.01,22°C). mp.108-110°C**

**No.1a - 1 6 3**  
**d<sub>4</sub>-DMSO, 300MHz**  
**0.97-1.84(14H,m),1.92(1H,m),2.04(2H,t,J=7.5Hz),3.00(1H,m),5.08-5.23(2H,m),7.32(1H,s),7.38-7.51(2H,m),7.62(1H,s)7.68-7.71(1H,m),7.83(1H,s),8.14-8.17(1H,m),10.7(1H,s),11.9(1H,s).**  
**IR(KBr):3350,3295,2952,2874,1707,1686,1601,1466,1431,1389,1315,1351,174,1146,1106/cm.**  
**[α]<sub>D</sub>= -25.8° (CH<sub>3</sub>OH,C=1.01,22°C). mp.159-162°C**

No.1a - 1 5 4

CDCl<sub>3</sub>, 300MHz

0.98-1.06(1H,m),2.05(1H,m),2.28(2H,t,J=7.2Hz),3.07(1H,m),4.82(2H,q,J=7.2Hz),5.19-5.25(2H,m),5.81(1H,d,J=7.8Hz),7.85(1H,m),7.41-7.62(3H,m),7.95(1H,m),8.15(1H,s).  
IR(CHCl<sub>3</sub>):3360,3018,2948,2870,1708,1638,1457,1446,1425,1394,1314,1178,1152,1105/cm.  
[α]<sub>D</sub>= +12.7° (CHCl<sub>3</sub>,C=1.02,25°C). mp.108-109°C

No.1a - 1 6 5

CDCl<sub>3</sub>, 300MHz

0.95-1.06(1H,m),2.28(2H,t,J=7.5Hz),3.04(1H,m),4.15(3H,s),5.80-5.96(2H,m),5.84(1H,d,J=8.9Hz),7.41-7.47(1H,m),7.65-7.68(2H,m),7.89-7.92(1H,m),8.82(1H,s).  
IR(CHCl<sub>3</sub>):3366,3087,3022,2957,1708,1638,1468,1408,1364,1346,1308,1227,1212,1208,1167/cm.  
[α]<sub>D</sub>= +19.6° (CHCl<sub>3</sub>,C=1.01,25°C).

No.1a - 1 6 6

CDCl<sub>3</sub>, 300MHz

0.97-2.03(1H,m),2.27(2H,t,J=8.9Hz),3.07(1H,m),4.14(3H,s),5.81-5.87(2H,m),5.47(1H,d,J=8.9Hz),7.64(1H,s),7.72(1H,d,d,J=0.6 & 9.0Hz),8.28(1H,s),8.47(1H,d,d,J=2.4 & 9.0Hz),8.94(1H,d,d,J=0.6 & 2.4Hz).  
IR(CHCl<sub>3</sub>):3373,2957,1708,1638,1587,1528,1467,1428,1415,1345,1231,1184,1158/cm.  
[α]<sub>D</sub>= +14.4° (CHCl<sub>3</sub>,C=0.50,25°C)

No.1a - 1 6 7

CDCl<sub>3</sub>, 300MHz

0.98-2.00(1H,m),2.15(1H,m),2.27(3H,t,J=7.2Hz),3.04(1H,m),3.97(2H,s),5.15-5.80(3H,m),7.35-7.47(2H,m),7.55-7.63(1H,m),7.80-7.96(3H,m),8.05(1H,d,J=0.8Hz).  
IR(CHCl<sub>3</sub>):3260,3020,2948,2868,1707,1451,1418,1319,1172,1144,1101,1071/cm.  
[α]<sub>D</sub>=+18.8° (CHCl<sub>3</sub>,C=1.04,22°C).

No.1a - 1 6 8

CDCl<sub>3</sub>, 300MHz

0.90-1.08(1H,m),2.16(1H,m),2.25(2H,t,J=8.9Hz),3.00(1H,m),5.00-5.19(2H,m),5.85(1H,d,J=8.6Hz),7.25-7.30(1H,m),7.48-7.50(2H,m),7.78(1H,d,d,J=1.5 & 8.1Hz),8.08-8.14(3H,m),8.93(1H,s).  
IR(CHCl<sub>3</sub>):3466,3380,3276,3018,2957,1708,1630,1495,1458,1324,1241,1150/cm.  
[α]<sub>D</sub>=+18.0° (CHCl<sub>3</sub>,C=1.00,22°C).

No.1a - 1 6 9

CDCl<sub>3</sub>, 300MHz

0.87-1.06(1H,m),2.15(1H,m),2.25(2H,t,J=8.9Hz),2.98(1H,m),2.89(3H,s),5.0-5.22(2H,m),5.27(1H,d,J=8.9Hz),6.66(1H,d,d,J=2.1 & 18.4Hz),6.84(1H,d,J=2.1Hz),7.89(1H,d,d,J=1.6 & 7.8Hz),7.92-8.01(3H,m),8.83(1H,s).  
IR(CHCl<sub>3</sub>):3468,3378,3278,3022,2957,1708,1630,1609,1569,1459,1358,1314,1281,1228,1161/cm.  
[α]<sub>D</sub>=+19.8° (CHCl<sub>3</sub>,C=1.01,21°C).

No.1a - 1 7 0

CDCl<sub>3</sub>, 300MHz

0.88-2.25(1H,m),3.04(1H,m),3.84(3H,s),3.95(3H,s),5.08-5.26(3H,m),6.87-6.93(3H,m),7.69(1H,d,d,J=1.6 & 8.2Hz),7.93-8.05(3H,m).

IR(CHCl<sub>3</sub>):3028,2957,1709,1630,1601,1460,1351,1243,1224,1153/cm.  
[α]<sub>D</sub>=+17.1° (CHCl<sub>3</sub>,c=1.00,25°C).

No.1a - 171

CDCl<sub>3</sub> 300MHz

0.95-2.00(14H,m),2.18-2.33(3H,m),2.66(3H,s),3.14(1H,m),3.68(3H,s),5.09(1H,d,J=6.8Hz),5.10-5.25(2H,m),7.45(1H,d,d,J=1.8Hz,6Hz),7.75-7.84(2H,m).  
IR(CHCl<sub>3</sub>):3374,3018,2946,2868,1723,1585,1513,1496,1340,1278,1155,1112/cm.

[α]<sub>D</sub>= -14.7° (CHCl<sub>3</sub>,c=1.07,25.0°C).

No.1a - 172

CDCl<sub>3</sub> 300MHz

0.97-2.02(14H,m),2.23(1H,m),2.38(2H,t,J=7.2Hz),2.68(3H,s),3.14(1H,m),3.1-5.23(2H,m),5.41(1H,d,J=7.2Hz),7.45(1H,d,d,J=2.1Hz,8.7Hz),7.78(1H,d,J=8.7Hz),7.78(1H,d,J=2.1Hz).

IR(CHCl<sub>3</sub>):3372,3250,3022,2950,2868,1707,1514,1419,1386,1279,1154,1112/cm.

[α]<sub>D</sub>= -4.1° (CHCl<sub>3</sub>,c=1.08,28.0°C) m.p.141-143°C

No.1a - 173

CDCl<sub>3</sub> 300MHz

1.15-2.42(17H,m),2.91(1H,m),3.15(1H,d,J=4.2Hz),3.25-5.40(2H,m),7.85(1H,t,J=7.2Hz),8.00(1H,t,J=8.1Hz),8.15-8.20(2H,m),8.67(1H,d,J=8.1Hz),8.78(1H,d,J=8.1Hz),8.88(1H,s),9.48(1H,s).

IR(KBr):3422,3269,3046,2952,2871,1711,1617,1447,1388,1243,1161,1146/cm.

[α]<sub>D</sub>=-41.0° (CH<sub>3</sub>OH,c=1.01,23°C).

No.1a - 174

CDCl<sub>3</sub>+d<sub>4</sub>-DMSO 300MHz

1.00-1.92(14H,m),2.20(2H,t,J=6.6Hz),2.35(1H,m),2.93(1H,m),5.05-5.32(2H,m),6.88(1H,d,J=5.4Hz),7.77-7.92(3H,m),8.81(1H,d,d,J=1.8 Hz,8.7Hz),8.89(1H,d,J=8.7Hz),8.78(1H,d,J=8.7Hz),9.01(1H,s),9.55(1H,d,J=1.8Hz).

IR(KBr):3458,3252,2952,2871,1696,1578,1493,1385,1305,1219,1186,1160,1106/cm.

[α]<sub>D</sub>=-19.8° (DMSO,c=0.50,25°C).

No.1a - 175

CDCl<sub>3</sub> 300MHz

0.96-1.87(14H,m),2.20-2.25(3H,m),2.95(1H,m),3.66(3H,s),4.74(1H,d,J=6.6Hz),5.10-5.12(2H,m),6.88(1H,d,J=1.8Hz),7.87-7.90(3H,m),7.86(1H,dd,J=8.7,1.6Hz),7.88-7.77(3H,m),8.06(1H,s),9.44(1H,dd,J=1.8Hz).

IR(CHCl<sub>3</sub>):3462,3374,3036,2906,2952,2872,1724,1610,1580,1484,1452,1356,1309,1147.

[α]<sub>D</sub>=+16.4° (CHCl<sub>3</sub>,c=1.05,26°C). mp.180-182°C.

No.1a - 176

CDCl<sub>3</sub>+CD<sub>3</sub>OD 300MHz

1.00-2.02(14H,m),2.22(1H,m),2.29(2H,t,J=6.9Hz),2.88(1H,m),5.15-5.26(2H,m),6.87(1H,s),7.28-7.87(4H,m),7.69(1H,d,J=8.4Hz),7.75-7.78(2H,m),7.99(1H,s).

IR(KBr):3254,2944,1704,1484,1483,1358,1305,1147.

[α]<sub>D</sub>=+18.0° (CH<sub>3</sub>OH,c=1.02,24°C). mp.160-161°C

No.1a - 177

CDCl<sub>3</sub> 300MHz

.96-1.88(14H,m),1.88-2.26(3H,m),2.84(1H,m),3.67(3H,s),3.57(3H,s),4.67(1

H,brs), 5.08-5.14(2H,m), 6.77(1H,d,J=1.5Hz), 6.89-7.02(2H,m), 7.53-7.57(1H, m), 7.65-7.70(2H,m), 8.00(1H,s), 9.37(1H,brs).

IR(CHCl<sub>3</sub>): 3426, 2876, 3006, 2952, 1724, 1610, 1498, 1488, 1357, 1306, 1282, 1249, 1177, 1147/cm.

[α]<sub>D</sub>=+18.1° (CHCl<sub>3</sub>, c=1.02, 22°C).

No.1a - 1 7 8

CDCl<sub>3</sub>+CD<sub>3</sub>OD 300MHz

0.98-1.91(14H,m), 2.19(1H,m), 2.27(2H,t,J=6.0Hz), 2.85(1H,m), 2.87(3H,s), 5.1 6-5.23(3H,m), 6.99-7.02(2H,m), 7.41(1H,m), 7.64-7.78(8H,m), 7.92(1H,m).

IR(CHCl<sub>3</sub>): 3866, 3281, 3004, 2954, 2878, 1706, 1611, 1498, 1458, 1438, 1304, 1286, 1263, 1180, 1149, 1128/cm.

[α]<sub>D</sub>=+14.8° (CHCl<sub>3</sub>, c=1.02, 22°C).

No.1a - 1 7 9

CDCl<sub>3</sub>+CD<sub>3</sub>OD 300MHz

0.98-1.87(14H,m), 2.15-2.28(3H,m), 2.93(1H,m), 3.85(3H,s), 4.10-5.10(2H,m), 6. 90-6.98(2H,m), 7.50(1H,m), 7.60-7.65(3H,m), 7.91(1H,d,J=0.9Hz).

IR(CHCl<sub>3</sub>): 3869, 3270, 3050, 2954, 2878, 1719, 1612, 1497, 1456, 1440, 1289, 1306, 1269, 1218, 1146, 1127/cm.

[α]<sub>D</sub>=+18.1° (CH<sub>3</sub>OH, c=1.00, 22°C).

No.1a - 1 8 0

CDCl<sub>3</sub>+CD<sub>3</sub>OD 300MHz

1.03-1.86(14H,m), 2.08-2.17(3H,m), 2.91(1H,m), 5.06-5.10(2H,m), 6.76(1H,m), 6.88-6.90(2H,m), 7.48(1H,m), 7.81-7.69(8H,m), 7.89(1H,m).

IR(CHCl<sub>3</sub>): 3860, 3269, 2954, 2878, 1706, 1612, 1497, 1457, 1360, 1306, 1272, 1230, 1176, 1148, 1126/cm.

[α]<sub>D</sub>=+20.9° (CH<sub>3</sub>OH, c=1.00, 22°C).

No.1a - 1 8 1

CDCl<sub>3</sub> 300MHz

0.97-1.96(14H,m), 2.15(1H,m), 2.39(2H,t,J=8.9Hz), 3.05(1H,m), 3.81(3H,s), 5.0 8(1H,d,J=6.9Hz), 5.23-5.35(2H,m), 6.62(1H,s), 7.47-7.54(5H,m), 7.59(1H,m), 7. 70(1H,m), 7.97(1H,m).

IR(CHCl<sub>3</sub>): 3860, 3260, 3020, 2946, 2868, 1706, 1466, 1388, 1288, 1149/cm.

[α]<sub>D</sub>=+32.9° (CHCl<sub>3</sub>, c=1.07, 22°C).

No.1a - 1 8 2

CDCl<sub>3</sub> 300MHz

0.94-1.90(14H,m), 2.28(2H,t,J=7.5Hz), 2.30(1H,m), 2.98(1H,m), 3.70(3H,s), 4.8 3(1H,d,J=6.6Hz), 5.13-5.16(2H,m), 6.98(1H,d,J=1.6Hz), 7.11-7.23(2H,m), 7.43( 1H,d,J=8.1Hz), 7.63(1H,d,J=8.1Hz), 7.79-7.93(4H,m), 8.08(1H,br).

IR(CHCl<sub>3</sub>): 3458, 3372, 3020, 3002, 2946, 2868, 1719, 1598, 1452, 1422, 1331, 1300, 1157/cm.

[α]<sub>D</sub>=-6.6° (CHCl<sub>3</sub>, c=1.00), mp 150-151°C

No.1a - 1 8 3

CDCl<sub>3</sub> 300MHz

0.95-1.94(14H,m), 2.36(1H,m), 2.28(3H,t,J=7.5Hz), 3.00(1H,m), 5.16-5.19(2H, m), 5.33(1H,d,J=7.2Hz), 6.93(1H,d,J=1.9Hz), 7.13(1H,m), 7.22(1H,dd,J=7.8,6. 6Hz), 7.42(1H,d,J=7.8Hz), 7.68(1H,d,J=7.8Hz), 7.76(2H,d,J=8.4Hz), 7.90(2H,d, J=8.4Hz), 8.85(1H,br).

IR(CHCl<sub>3</sub>): 3458, 3374, 3260, 3020, 3002, 2948, 2868, 1706, 1598, 1453, 1422, 130 1, 1156/cm.

[α]<sub>D</sub>=+17.9° (CHCl<sub>3</sub>, c=1.01, 22°C).

No.1a - 1 8 4

**CDCl<sub>3</sub>, 200MHz**  
**0.93-2.00(1H,m), 2.20(1H,m), 2.34(2H,t,J=6.8Hz), 2.05(1H,m), 2.20-2.38(2H,  
m), 7.39-7.44(2H,m), 7.51-7.66(1H,m), 7.80-7.84(1H,m), 8.05(2H,d,J=8.8Hz), 8.  
40(2H,d,J=8.6Hz).**  
**IR(CHCl<sub>3</sub>): 3084, 2971, 3019, 2958, 1709, 1618, 1599, 1551, 1458, 1405, 1344, 1326,  
1248, 1168/cm.**  
**[α]<sub>D</sub>=+18.5° (CHCl<sub>3</sub>, C=1.00, 21°C).**

No.1a - 1 8 5

**CDCl<sub>3</sub>, 200MHz**  
**0.89-2.20(1H,m), 2.38(2H,d,t,J=2.1 g 7.2Hz), 2.99(1H,m), 3.08(1H,d,J=6.8H  
s), 3.09-3.24(2H,m), 3.90(1H,d,J=1.2Hz), 7.33-7.48(4H,m), 7.84-7.73(3H,m), 8.  
20(1H,d,J=1.2Hz), 9.00(1H,s).**  
**IR(CHCl<sub>3</sub>): 3464, 3375, 3275, 3022, 2958, 1707, 1605, 1490, 1449, 1356, 1333, 1219,  
1147, 1121/cm.**  
**[α]<sub>D</sub>=+21.6° (CHCl<sub>3</sub>, C=1.01, 23°C).**

No.1a - 1 8 6

**CDCl<sub>3</sub>, 200MHz**  
**1.36-2.24(14H,m), 2.31(2H,t,J=7.4Hz), 2.49(1H,brs), 3.87(1H,m), 3.87(3H,s), 5.  
38-5.50(3H,m), 7.40-7.68(9H,m).**  
**IR(CHCl<sub>3</sub>): 3878, 1727, 1602, 1485, 1362, 1221, 1207, 1168, 1045/cm.**

No.1a - 1 8 7

**CDCl<sub>3</sub>, 200MHz**  
**1.10-2.25(14H,m), 2.36(2H,t,J=7.3Hz), 3.47(1H,m), 3.87(1H,m), 5.88-6.54(2H,  
m), 5.62(1H,d,J=7.3Hz), 7.39-7.70(9H,m).**  
**IR(CHCl<sub>3</sub>): 3674, 3496, 3378, 3284, 3012, 2952, 2850, 1725(sh), 1709, 1602, 1.  
485, 1420, 1360, 1167/cm.**

**[α]<sub>D</sub>=+32° (CHCl<sub>3</sub>, C=1.00).**

No.1a - 1 8 8

**CDCl<sub>3</sub>, 200MHz**  
**0.86-1.93(14H,m), 2.22(8H,m), 2.36(3H,s), 2.95(1H,m), 3.67(3H,s), 3.93(3H,s), 4.  
81(1H,d,J=6.2Hz), 5.04-5.20(2H,m), 7.02-7.08(2H,m), 7.31(1H,d,J=8.6Hz), 7.3  
9(1H,d,J=7.8Hz), 7.79-7.89(3H,m).**  
**IR(CHCl<sub>3</sub>): 3855, 3366, 3029, 3019, 3015, 2954, 2877, 1718, 1617, 1592, 1587, 1507,  
1311, 1269, 1153 /cm.**  
**[α]<sub>D</sub>= -29.4° (CHCl<sub>3</sub>, C=1.01, 25°C).**

No.1a - 1 8 9

**[α]<sub>D</sub>=-7.7° (CHCl<sub>3</sub>, C=1.00, 24°C).**

No.1a - 1 9 0

**[α]<sub>D</sub>=-17.8° (CHCl<sub>3</sub>, C=1.00, 24°C).**

No.1a - 1 9 1

**CDCl<sub>3</sub>, 200MHz**  
**0.96-2.20(14H,m), 2.30(1H,m), 2.36(2H,d,J=6.9Hz), 2.31(1H,m), 4.85(2H,s), 5.0  
7(1H,d,J=7.8Hz), 5.86-5.48(2H,m), 7.25(1H,dd,J=1.8 g 8.1Hz), 7.33-7.35(2  
H,m), 7.39(1H,d,J=8.1Hz), 7.94(1H,s), 8.14(1H,d,J=2.7Hz), 8.38(1H,d,d,J=2.7  
g 8.7Hz).**  
**IR(CHCl<sub>3</sub>): 3886, 3028, 3015, 2957, 2877, 2683, 1702, 1617, 1573, 1530, 1348, 1128  
/cm.**  
**[α]<sub>D</sub>= -6.1° (CHCl<sub>3</sub>, C=1.01, 25°C).**

No.1a - 1 9 2

**CDCl<sub>3</sub>, 200MHz**

0.92-2.20(14H,m),2.18(3H,m),2.23(1H,m),3.04(3H,s),3.04(3H,s),4.22(2H,s),4.38(1H,d,J=7.5Hz),5.87-5.42(2H,m),7.18-7.42(8H,m),7.53(1H,d,J=8.4Hz),7.94(1H,s).  
IR(CHCl<sub>3</sub>):3389,3092,3013,2958,2877,1716,1616,1660,1485,1340,1326,1124/cm.  
[α]<sub>D</sub>= -15.2° (CHCl<sub>3</sub>,c=1.01,25°C).

No.1a-1  
CDCl<sub>3</sub> 300MHz  
0.92-2.20(14H,m),2.25(1H,m),2.85(2H,t,J=7.2Hz),3.17(1H,m),4.22(2H,s),4.391(1H,d,J=7.5Hz),5.87-5.42(2H,m),7.18-7.43(8H,m),7.60(1H,d,J=8.1Hz),8.05(1H,s).  
IR(CHCl<sub>3</sub>):3311,3387,3029,3020,3011,2987,2877,2851,1696,1614,1560,1505,1320,1280,1252,1126/cm.  
[α]<sub>D</sub>= -0.9° (CHCl<sub>3</sub>,c=1.00,25°C).

No.1b-1  
CDCl<sub>3</sub> 300MHz  
0.98-1.56(15H,m),1.85-1.90(5H,m),2.23(1H,m),3.05(1H,m),3.86(3H,s),4.77(1H,d,J=8.0Hz),5.05-5.28(2H,m),7.46(3H,m),7.88-7.54(2H,d,J=7.5Hz),7.72(2H,d,J=8.4Hz),7.93(2H,d,J=8.4Hz).  
IR(CHCl<sub>3</sub>):3384,3028,2952,2878,1719,1695,1691,1322,1155/cm.  
[α]<sub>D</sub>= +4.0→6.0(CHCl<sub>3</sub>,c=1.00,25°C).  
mp.96-98°C

No.1b-3  
CDCl<sub>3</sub> 300MHz  
0.98-1.52(15H,m),1.85-1.90(5H,m),2.17(1H,m),3.00(1H,m),3.67(3H,s),4.05(3H,s),4.88(1H,d,J=8.0Hz),5.05-5.28(2H,m),7.14(2H,d,J=7.2Hz),7.17-7.82(5H,m),7.78(2H,d,J=8.4Hz).  
IR(CHCl<sub>3</sub>):3384,3028,2952,2874,1719,1695,1658,1407,1320,1180/cm.  
[α]<sub>D</sub>= +2.5° (CHCl<sub>3</sub>,c=1.02,24°C).

No.1b-8  
CDCl<sub>3</sub> 300MHz  
0.96-2.05(20H,m),3.07(1H,m),3.07(1H,m),4.04(2H,s),5.21-5.35(2H,m),5.55(1H,d,J=8.9Hz),7.14(3H,d,J=8.6Hz),7.20-7.82(5H,m),7.78(2H,d,J=8.1Hz).  
IR(CHCl<sub>3</sub>):3250,3022,2950,1699,1696,1495,1453,1405,1318,1153/cm.  
[α]<sub>D</sub>= +17.1° (CHCl<sub>3</sub>,c=1.01,25°C).  
mp.129-131°C.

No.1b-4  
CDCl<sub>3</sub> 300MHz  
0.90-2.10(15H,m),1.19(3H,s),1.20(3H,s),3.11(1H,m),3.94-5.32(2H,m),5.70(1H,d,J=8.6Hz),7.38-7.68(4H,m),7.96-8.04(2H,m),8.88(1H,d,J=1.4Hz).  
IR(CHCl<sub>3</sub>):3384,3246,2958,1701,1682,1695,1468,1445,1323,1218,1202,1190,1155,1122/cm.  
[α]<sub>D</sub>= +10.9° (CHCl<sub>3</sub>,c=0.51,25°C).

No.1b-5  
1.02-2.10(15H,m),1.16(3H,s),3.02(1H,m),4.06(3H,s),5.28-5.38(2H,m),5.78(1H,d,J=7.2Hz),7.38-7.68(4H,m),7.97(1H,d,J=7.5Hz),8.18(1H,s).  
IR(CHCl<sub>3</sub>):3389,2959,1702,1685,1585,1486,1454,1441,1415,1318,1323,1159,1170,1154/cm.  
[α]<sub>D</sub>= +9.9° (CHCl<sub>3</sub>,c=1.00,25°C).

No.1c-1  
CDCl<sub>3</sub> 300MHz

1.10-2.03(14H,m),2.27(2H,t,J=7.5Hz),2.50(1H,m),2.69(3H,s),3.31(1H,m),3.54(3H,s),5.18-5.80(2H,m),7.84-7.42(3H,m),7.80-7.59(2H,m),7.82-7.68(2H,m),7.76-7.62(3H,m).  
IR(CHCl<sub>3</sub>):3020,2946,2868,2212,1727,1598,1495,1487,1389,1158,1155,1084/cm.  
[α]<sub>D</sub>=-16.1° (CHCl<sub>3</sub>,c=1.05,25.0°C).  
m.p.100-102°C

No.1c-2

CDCl<sub>3</sub> 800MHz

1.10-2.06(14H,m),2.23(2H,t,J=7.5Hz),2.55(1H,m),2.91(3H,s),3.35(1H,m),3.62(3H,s),5.02-5.80(2H,m),7.80-7.60(3H,m),7.90-8.08(6H,m).  
IR(CHCl<sub>3</sub>):3018,2946,2868,1728,1487,1398,1340,1160,1088/cm.  
[α]<sub>D</sub>=-22.5° (CHCl<sub>3</sub>,c=1.00,25.0°C).

No.1c-3

CD<sub>3</sub>OD 800MHz

1.15-2.06(14H,m),2.13(2H,t,J=7.2Hz),2.47(1H,m),2.91(3H,s),3.27(1H,m),4.80-5.30(2H,m),7.87-7.44(3H,m),7.53-7.61(2H,m),7.71-7.77(2H,m),7.81-7.87(2H,m).  
IR(KBr):3412,2999,2951,2871,2217,1560,1399,1243,1158,1137,1103,1084.  
[α]<sub>D</sub>=-5.6° (CH<sub>3</sub>OH,c=1.03,25°C).

No.1d-1

CDCl<sub>3</sub> 800MHz

1.00-2.16(16H,m),2.36(2H,t,J=7.2Hz),3.17(1H,m),3.83(3H,s),5.23-5.43(8H,m),7.51-7.59(3H,m),7.91-8.10(6H,m),9.02(1H,br).  
IR(CHCl<sub>3</sub>):3882,3268,3028,2954,2874,1718,1442,1400,1387,1162,1120,1089/cm.

[α]<sub>D</sub>=+40.0° (CHCl<sub>3</sub>,c=0.58,25°C).

No.1d-2

CDCl<sub>3</sub> 800MHz

1.03-2.30(17H,m),3.03(1H,m),4.08(2H,s),5.26(2H,m),5.84(1H,br),5.85-5.89(1H,d,J=6.6Hz),6.08(1H,br),7.14(2H,d,J=8.1Hz),7.26-7.81(5H,m),7.80(2H,d,J=8.1Hz).  
IR(CHCl<sub>3</sub>):3878,3003,2946,1689,1595,1492,1454,1408,1318,1154/cm.  
[α]<sub>D</sub>=+4.8° (CHCl<sub>3</sub>,c=1.00,25°C).

No.1d-3

CDCl<sub>3</sub> 800MHz

0.96-2.17(17H,m),2.33(2H,t,J=6.9Hz),3.01(1H,m),4.04(2H,s),5.10(1H,d,J=6.6Hz),5.21-5.26(2H,m),7.14(2H,d,J=8.7Hz),7.16-7.32(5H,m),7.78(2H,d,J=8.4Hz).  
IR(CHCl<sub>3</sub>):3860,3030,2946,1711,1598,1492,1457,1407,1318,1154/cm.

[α]<sub>D</sub>=+9.8° (CHCl<sub>3</sub>,c=1.03,25°C).

No.1d-4

CDCl<sub>3</sub> 800MHz

0.96-2.14(16H,m),2.34(2H,t,J=7.2Hz),3.09(1H,m),3.80(3H,s),4.04(2H,s),5.19(1H,d,J=7.2Hz),5.22-5.89(2H,m),7.10-7.35(7H,m),7.51(2H,d,J=8.1Hz),9.10(1H,brs).

IR(CHCl<sub>3</sub>):3882,3260,3028,2953,2874,2670,1718,1595,1492,1450,1405,1388,1160,1120,1092/cm.

[α]<sub>D</sub>=+22.2° (CHCl<sub>3</sub>,c=1.07,25°C).

No.1d-5

CDCl<sub>3</sub> 800MHz

1.00-2.10(14H,m),2.30-2.39(3H,m),2.18(1H,m),2.35(3H,s),5.15-5.40(3H,m),7.41(1H,d,J=0.9 Hz),7.60-7.69(3H,m),7.88-8.18(2H,m),8.60(1H,d,J=1.5Hz),9.08(1H,s).  
IR(CHCl<sub>3</sub>):8862,8268,8028,2954,2874,1714,1443,1402,1838,1185,1155,1211,1072/cm.  
[α]<sub>D</sub>=+15.3° (CHCl<sub>3</sub>,c=1.00,23°C).

No.1e-1  
CDCl<sub>3</sub>, 300MHz  
1.19-2.45(19H,m),2.58(1H,m),5.63(1H,d,J=8.0Hz),7.42-7.65(4H,m),7.94-8.08(2H,m),8.49-8.60(1H,m).  
IR(CHCl<sub>3</sub>):8293,8024,1710,1696,1584,1467,1445,1410,1824,1222,1213,1204,1190,1160/cm.  
[α]<sub>D</sub>=-41.1° (CHCl<sub>3</sub>,c=1.01,23°C).

No.1e-2  
CDCl<sub>3</sub>, 300MHz  
1.10-2.26(19H,m),2.94(1H,m),4.12(3H,s),5.58(1H,d,J=7.2Hz),7.89(1H,m),7.80-7.62(3H,m),7.96(1H,d,J=7.5Hz),8.18(1H,s).  
IR(CHCl<sub>3</sub>):8387,8025,2958,1711,1684,1600,1584,1468,1454,1440,1415,1342,1317,1222,1189,1157/cm.  
[α]<sub>D</sub>=-1.2° (CHCl<sub>3</sub>,c=1.00,23°C).

No.1f-1  
CDCl<sub>3</sub>, 300MHz  
1.08-2.47(19H,m),2.56(1H,m),5.52(2H,t,J=6.6Hz),5.59(1H,d,J=2.4Hz),7.40-7.68(4H,m),7.95-8.04(2H,m),8.50(1H,d,J=1.8Hz).  
IR(CHCl<sub>3</sub>):8624,8883,3295,2950,2877,1705,1595,1584,1468,1445,1405,1347,1387,1224,1224,1190,1160/cm.  
[α]<sub>D</sub>=-54.1° (CHCl<sub>3</sub>,c=1.01,23°C).

No.1f-2  
CDCl<sub>3</sub>, 300MHz  
1.08-2.34(18H,m),2.94(1H,m),8.58(2H,t,J=6.8Hz),4.18(3H,s),5.47(1H,d,J=6.6Hz),7.36-7.68(4H,m),7.96(1H,d,J=6.8Hz),8.14(1H,s).  
IR(CHCl<sub>3</sub>):8625,3365,3025,8018,2949,2877,1710,1684,1600,1584,1468,1454,1440,1415,1342,1317,1232,1220,1189,1157/cm.  
[α]<sub>D</sub>=-5.6° (CHCl<sub>3</sub>,c=1.00,23°C).

No.1g-1  
CDCl<sub>3</sub>, 200MHz  
1.17-2.34(15H,m),2.22(1H,m),5.10-5.16(2H,m),5.48(1H,d,J=7.0Hz),7.35-7.66(4H,m),7.95-8.01(2H,m),8.51(1H,d,J=2.0Hz).  
IR(CHCl<sub>3</sub>):8883,8275,2959,1707,1595,1584,1468,1445,1428,1519,1269,1248,1190,1149,1128/cm.  
[α]<sub>D</sub>=-84.3° (CHCl<sub>3</sub>,c=1.01,23°C).

No.1g-2  
CDCl<sub>3</sub>, 300MHz  
1.10-2.18(18H,m),2.56(2H,t,J=7.2Hz),5.31(1H,m),4.09(3H,s),5.10-5.22(3H,m),5.43(1H,d,J=7.8Hz),7.36-7.62(4H,m),7.96(1H,d,J=7.8Hz),8.12(1H,s).  
IR(CHCl<sub>3</sub>):8366,2959,1708,1635,1600,1585,1467,1454,1440,1415,1345,1518,1238,1189,1152/cm.  
[α]<sub>D</sub>=+108.1° (CHCl<sub>3</sub>,c=1.01,23°C).

No.1h-1  
CDCl<sub>3</sub>, 300MHz  
0.90-1.60(17H,m),1.83(1H,m),2.11(1H,m),2.22(2H,t,J=7.2Hz),5.07(1H,m),5.

11(1H,d,J=7.2Hz),7.38-7.47(1H,m),7.50-7.60(1H,m),7.60-7.72(2H,m),7.88-s,  
 12(2H,m),8.54(1H,d,J=0.5Hz).  
 IR(CHCl<sub>3</sub>):3882,3274,2926,1707,1484,1442,1318,1366,1186,1158,1121,1108,  
 1071,1019/cm.  
 [α]<sub>D</sub>=-2.8° (CHCl<sub>3</sub>,c=1.01,24°C).

No.1i-1  
 [α]<sub>D</sub>=+50.9° (CHCl<sub>3</sub>,c=1.01,24°C).

No.1i-2  
 CDCl<sub>3</sub> 300MHz  
 0.88-1.70(11H,m),1.80-2.00(5H,m),2.18(1H,m),5.08(1H,m),5.64(2H,t,J=8.8Hz)  
 s),4.08(3H,s),4.69(1H,d,J=8.6Hz),5.15(1H,m),5.25(1H,m),7.16(2H,d,J=7.2Hz)  
 ),7.27-7.32(5H,m),7.77(2H,d,J=8.4Hz).  
 IR(CHCl<sub>3</sub>):3876,3004,2946,2816,1596,1492,1458,1407,1318,1184/cm.  
 [α]<sub>D</sub>=+8.6° (CHCl<sub>3</sub>,c=1.00,22°C).  
 mp.80.5-82.0°C

No.1j-1  
 [α]<sub>D</sub>=-7.5±0.5° (CHCl<sub>3</sub>,c=1.05,22°C).

No.1j-2  
 [α]<sub>D</sub>=-9.7±0.5° (CHCl<sub>3</sub>,c=1.06,22°C).

No.1j-3  
 [α]<sub>D</sub>=+15.0±0.5° (CH<sub>3</sub>OH,c=1.06,24.5°C).  
 mp.101-108°C

No.1j-4  
 [α]<sub>D</sub>=-28.0±0.6° (CHCl<sub>3</sub>,c=1.06,24°C).  
 mp.159-161°C

1j-5  
 [α]<sub>D</sub>=-12.5±0.5° (CHCl<sub>3</sub>,c=1.04,23°C).  
 mp.99-101°C

No.1j-6  
 CDCl<sub>3</sub> 300MHz  
 0.90-2.03(14H,m),2.20(1H,m),2.30(2H,t,J=7.2Hz),5.00(1H,m)5.68(3H,s),4.76  
 (1H,d,J=6.5Hz),5.13-5.85(2H,m),7.01-7.08(4H,m),7.18-7.26(1H,m),7.37-7.46  
 (2H,m),7.80-7.84(2H,m).  
 IR(CHCl<sub>3</sub>):3882,3230,3080,3016,2952,2900,1727,1582,1482,1322,1180/  
 cm.  
 [α]<sub>D</sub>=-81.0° (CHCl<sub>3</sub>,c=1.05,28°C).

No.1j-7  
 CDCl<sub>3</sub> 300MHz  
 0.91-2.09(14H,m),2.15(1H,m),2.35(2H,t,J=7.5Hz),3.01(1H,m),5.17(1H,d,J=8.  
 6Hz),5.31-5.84(2H,m),7.01-7.08(4H,m),7.18-7.37(1H,m),7.37-7.48(2H,m),7.8  
 0-7.85(2H,m).  
 IR(CHCl<sub>3</sub>):3474,3586,3270,3024,2958,2900,2875,1711,1584,1482,1420,1328,  
 1298,1180/cm.  
 [α]<sub>D</sub>=-18.4° (CHCl<sub>3</sub>,c=1.01,26°C).

No.1j-8  
 CDCl<sub>3</sub> 300MHz  
 0.95-2.14(13H,m),2.30(2H,t,J=7.5Hz),2.36(1H,m),2.84(1H,m),2.81(1J=4.8Hz)  
 ),3.66(3H,s),5.33-5.59(2H,m),6.82-6.87(1H,m),6.88-7.00(2H,m),7.09-7.15(4H,

m), 7.28-7.38 (2H, m), 7.54-7.59 (1H, m).  
IR (CHCl<sub>3</sub>): 3350, 3010, 2950, 2880, 1722, 1608, 1582, 1489, 1461, 1435, 1360, 1160  
cm.  
[α]<sub>D</sub> = +76.1° (CHCl<sub>3</sub>, c=1.18, 26°C).

No.1j-9  
CDCl<sub>3</sub>, 300MHz  
0.95-2.03 (14H, m), 2.20 (1H, m), 2.39 (2H, t, J=7.5Hz), 3.04 (1H, m), 3.68 (3H, s), 4.9  
8 (1H, d, J=7.4Hz), 5.14-5.34 (2H, m), 7.48-7.54 (2H, m), 7.60-7.68 (1H, m), 7.75-7.8  
0 (2H, m), 7.88-7.92 (2H, m), 7.99-8.03 (2H, m).  
IR (CHCl<sub>3</sub>): 3384, 3260, 3020, 2960, 2888, 1727, 1662, 1600, 1816, 1278, 1168/cm.  
[α]<sub>D</sub> = -41.0° (CHCl<sub>3</sub>, c=1.17, 26°C).

No.1j-10  
CDCl<sub>3</sub>+CD<sub>3</sub>OD 300MHz  
0.94-2.08 (14H, m), 2.21 (1H, m), 2.34 (2H, t, J=6.2Hz), 3.04 (1H, m), 5.21-5.85 (2H,  
m), 5.40 (1H, m), 7.48-7.58 (2H, m), 7.64-7.68 (1H, m), 7.79-8.06 (6H, m).  
IR (CHCl<sub>3</sub>): 3475, 3370, 3250, 3018, 2956, 2976, 2880, 1709, 1662, 1595, 1445, 1420,  
1395, 1317, 1274, 1168/cm.  
[α]<sub>D</sub> = -17.1° (CHCl<sub>3</sub>, c=1.13, 26°C).

No.1j-11  
CDCl<sub>3</sub>, 300MHz  
1.06-1.98 (14H, m), 2.24-2.29 (3H, m), 2.18 (1H, m), 2.68 (3H, s), 5.10-5.34 (2H, m), 5.  
40 (1H, d, J=8.5Hz), 7.39-7.49 (3H, m), 7.59-7.64 (8H, m), 7.60-7.88 (2H, m), 8.06-8.  
11 (1H, m).  
IR (CHCl<sub>3</sub>): 3302, 3012, 2948, 2805, 1727, 1661, 1592, 1485, 1389, 1312, 1287, 1271,  
1168/cm.  
[α]<sub>D</sub> = +15.8° (CHCl<sub>3</sub>, c=1.08, 26°C).

No.1j-12  
CDCl<sub>3</sub>, 300MHz  
1.08-1.98 (14H, m), 2.23 (1H, m), 2.38 (2H, t, J=7.5Hz), 3.16 (1H, m), 5.18-5.26 (2H,  
m), 5.89-5.45 (1H, m), 7.39-7.49 (3H, m), 7.60-7.64 (8H, m), 7.60-7.89 (2H, m), 8.09-  
8.12 (1H, m).  
IR (CHCl<sub>3</sub>): 3225, 3022, 2956, 2872, 2880, 1708, 1662, 1608, 1598, 1425, 1340, 1318,  
1268, 1271, 1168/cm.  
[α]<sub>D</sub> = +9.7° (CHCl<sub>3</sub>, c=0.52, 26°C).

No.1j-13  
CDCl<sub>3</sub>, 300MHz  
0.95-2.00 (14H, m), 2.20 (1H, m), 2.27 (2H, t, J=6.8Hz), 3.03 (1H, m), 3.67 (3H, s), 4.9  
9 (1H, d, J=6.6Hz), 5.13-5.31 (2H, m), 7.47-7.55 (2H, m), 7.60-7.69 (3H, m), 7.76-7.8  
1 (2H, m), 7.96-8.05 (1H, m), 8.08-8.14 (1H, m), 8.27-8.28 (1H, m).  
IR (CHCl<sub>3</sub>): 3374, 3358, 3376, 3276, 3012, 2948, 2880, 1726, 1662, 1595, 1440, 1385,  
1317, 1297, 1274, 1168, 1150/cm.  
[α]<sub>D</sub> = +10.8° (CHCl<sub>3</sub>, c=1.00, 26°C).

No.1j-14  
CDCl<sub>3</sub>, 300MHz  
0.98-2.08 (14H, m), 2.21 (1H, m), 2.32 (2H, t, J=6.8Hz), 3.00 (1H, m), 5.20-5.38 (2H,  
m), 5.38 (1H, d, J=6.2Hz), 7.50-7.58 (2H, m), 7.63-7.71 (3H, m), 7.77-7.81 (2H, m), 7.  
99-8.04 (1H, m), 8.10-8.18 (1H, m), 8.32-8.38 (1H, m).  
IR (CHCl<sub>3</sub>): 3374, 3360, 3374, 3356, 3012, 2950, 2876, 2850, 1708, 1662, 1598, 1418,  
1385, 1317, 1274, 1148/cm.  
[α]<sub>D</sub> = +61.0° (CHCl<sub>3</sub>, c=1.19, 26°C).

No.1j-15

**CDCl<sub>3</sub>, 800MHz**  
**0.90-2.00(14H,m), 2.19(1H,m), 2.50(2H,t,J=7.5Hz), 3.01(1H,m), 3.67(3H,s), 4.82(1H,d,J=8.4Hz), 5.14-5.84(2H,m), 7.86-7.89(3H,m), 7.58-7.57(2H,m), 7.62-7.66(2H,m), 7.88-7.85(2H,m).**  
**IR(CHCl<sub>3</sub>): 3876, 3276, 3010, 2948, 2868, 2212, 1727, 1597, 1500, 1487, 1325, 1161/cm.**  
**[α]<sub>D</sub>= -7.2° (CHCl<sub>3</sub>, c=1.00, 26°C).**

**No.1j-16**  
**CDCl<sub>3</sub>, 800MHz**  
**0.98-2.08(14H,m), 2.15(1H,m), 2.36(2H,t,J=7.5Hz), 3.05(1H,m), 3.20-3.40(3H,m), 7.86-7.89(3H,m), 7.55-7.66(4H,m), 7.84-7.88(2H,m).**  
**IR(CHCl<sub>3</sub>): 3470, 3276, 3012, 2950, 2868, 2675, 2212, 1708, 1596, 1503, 1416, 1396, 1322, 1160.**  
**[α]<sub>D</sub>= -22.4° (CHCl<sub>3</sub>, c=1.00, 26°C).**

**No.1j-17**  
**CDCl<sub>3</sub>, 800MHz**  
**1.00-1.60(9H,m), 1.79-1.89(5H,m), 2.17(1H,brs), 2.28(2H,t,J=7.2Hz), 3.03(1H,m), 3.10-5.23(2H,m), 5.49(1H,d,J=8.4Hz), 7.40(1H,t,J=7.4Hz), 7.53(1H,t,J=7.2Hz), 7.60-7.68(2H,m), 7.98-8.03(2H,m), 8.55(1H,d,J=1.6Hz).**  
**IR(CHCl<sub>3</sub>): 3616, 3364, 3270, 2868, 1708, 1698, 1584, 1467, 1445, 1425, 1374, 1345, 1321, 1269, 1248, 1218/cm.**  
**[α]<sub>D</sub>= -7.8° (CHCl<sub>3</sub>, c=1.01, 22°C).**

**No.1j-18**  
**CDCl<sub>3</sub>, 800MHz**  
**0.90-2.03(14H,m), 2.19(1H,m), 2.50(2H,t,J=7.5Hz), 3.00(1H,m), 3.67(3H,s), 4.80(1H,d,J=8.4Hz), 5.14-5.35(2H,m), 6.99-7.04(2H,m), 7.16-7.32(3H,m), 7.34-7.49(4H,m), 7.57-7.61(1H,m).**  
**IR(CHCl<sub>3</sub>): 3876, 3276, 3012, 2948, 2875, 1727, 1582, 1488, 1471, 1432, 1330, 1311, 1150/cm.**  
**[α]<sub>D</sub>= +54.0° (CHCl<sub>3</sub>, c=0.99, 25°C).**

**No.1j-19**  
**CDCl<sub>3</sub>, 800MHz**  
**0.91-2.09(14H,m), 2.16(1H,m), 2.94(2H,t,J=7.5Hz), 3.01(1H,m), 3.16(1H,d,J=8.4Hz), 5.24-5.40(2H,m), 7.01-7.08(2H,m), 7.15-7.26(2H,m), 7.55-7.58(4H,m), 7.59-7.65(1H,m).**  
**IR(CHCl<sub>3</sub>): 3470, 3376, 3260, 3012, 2950, 2876, 2640, 1708, 1588, 1488, 1471, 1430, 1335, 1305, 1149/cm.**  
**[α]<sub>D</sub>= -21.0° (CHCl<sub>3</sub>, c=1.80, 26°C).**

**No.1j-20**  
**CDCl<sub>3</sub>, 800MHz**  
**1.17(1H,m), 1.26-1.84(2H,m), 1.54-2.24(11H,m), 2.51(2H,t,J=7.4Hz), 3.48(1H,brs), 3.87(1H,m), 3.67(3H,s), 5.35-5.60(2H,m), 7.89-7.68(9H,m).**  
**IR(CHCl<sub>3</sub>): 3877, 1727, 1601, 1435, 1362, 1168/cm.**

**No.1j-21**  
**CDCl<sub>3</sub>, 800MHz**  
**1.10-2.25(14H,m), 2.86(2H,t,J=7.2Hz), 3.47(1H,m), 3.89(1H,m), 3.85-5.53(2H,m), 5.63(1H,d,J=7.2Hz), 7.40-7.71(9H,m).**  
**IR(CHCl<sub>3</sub>): 3674, 3498, 3374, 3294, 3010, 2952, 2870, 2640, 1730(sh), 1710, 1608, 1485, 1426, 1360, 1167/cm.**  
**[α]<sub>D</sub>= -48.0° (CHCl<sub>3</sub>, c=1.01, 25°C).**

**No.1j-22**

**CDCl<sub>3</sub>, 800MHz**  
**0.98-1.95(14H,m), 2.25-2.81(3H,m), 2.95(1H,m), 5.19-5.80(3H,m), 5.88(1H,d,J=8.3Hz), 6.58(1H,d,J=7.5Hz), 6.80(1H,t,J=7.5Hz), 6.99-7.05(1H,m), 7.44-7.68(6H,m), 7.80-7.78(2H,m), 7.94-7.78(2H,m), 8.28-8.26(2H,m), 10.65(1H,s).**  
**IR(CHCl<sub>3</sub>): 3675, 3275, 3260, 3008, 2982, 2868, 2722, 1725, 1710(ab), 1668, 1590, 1571, 1525, 1448, 1437, 1345, 1317, 1161, 1112/cm.**  
**[α]<sub>D</sub>=+12.9° (CHCl<sub>3</sub>, c=0.12, 23°C).**

**No.1j-23**  
**CDCl<sub>3</sub>, 800MHz**  
**0.94-1.94(14H,m), 2.22-2.80(3H,m), 2.98(1H,m), 3.68(3H,s), 5.09(1H,d,J=6.2Hz), 5.15-5.28(2H,m), 7.14-7.22(1H,m), 7.24-7.42(2H,m), 7.68-7.78(2H,m), 7.89-8.08(4H,m), 8.51(1H,s).**  
**IR(CHCl<sub>3</sub>): 3875, 3275, 1724, 1678, 1699, 1488, 1320, 1161/cm.**  
**[α]<sub>D</sub>= +17.0° (CHCl<sub>3</sub>, c=1.38, 23°C).**

**No.1j-24**  
**CDCl<sub>3</sub>+CD<sub>3</sub>OD 800MHz**  
**0.96-2.05(14H,m), 2.25-2.34(3H,m), 2.92(1H,m), 5.16-5.84(2H,m), 7.14-7.22(1H,m), 7.29-7.42(2H,m), 7.70(2H,d,J=7.6Hz), 7.92-8.05(4H,m).**  
**IR(CHCl<sub>3</sub>): 3616, 3426, 3275, 3010, 2960, 2828, 2845, 1708, 1672, 1599, 1489, 1328, 1161/cm.**  
**[α]<sub>D</sub>=+21.0° (CH<sub>3</sub>OH, c=1.00, 23°C).**

**No.1j-25**  
**CDCl<sub>3</sub>, 800MHz**  
**1.03(1H,m), 1.18-2.01(18H,m), 2.20(1H,bre), 2.27(2H,t,J=7.4Hz), 3.08(1H,m), 3.68(3H,s), 5.11(1H,d,J=8.6Hz), 5.14-5.84(2H,m), 7.54-7.62(3H,m), 8.04-8.32(6H,m).**  
**IR(CHCl<sub>3</sub>): 3884, 3275, 1726, 1605, 1484, 1448, 1331, 1161/cm.**

**No.1j-26**  
**CDCl<sub>3</sub>+CD<sub>3</sub>OD 800MHz**  
**1.08-2.10(14H,m), 2.29(1H,m), 2.31(2H,t,J=7.5Hz), 2.98(1H,m), 5.28-5.85(2H,m), 7.55-7.66(3H,m), 8.05-8.08(2H,m), 8.14-8.18(2H,m), 8.28-8.31(2H,m).**  
**IR(  $\frac{1}{2}$  ): 3260, 2720, 2660, 1711, 1545, 1460, 1317, 1163/cm.**  
**[α]<sub>D</sub>=+15.8° (CH<sub>3</sub>OH, c=1.01, 23°C).**

**No.1j-27**  
**[α]<sub>D</sub>= +16.7° (CHCl<sub>3</sub>, c=1.00, 23°C).**

**No.1j-28**  
**CDCl<sub>3</sub>, 800MHz**  
**1.01(1H,m), 1.14-1.29(2H,m), 1.46-2.19(11H,m), 2.33(2H,t,J=7.2Hz), 3.41(1H,bre), 3.18-3.31(6H,m), 3.68(3H,s), 3.78-3.76(4H,m), 4.87(1H,d,J=7.2Hz), 5.85-5.45(2H,m).**  
**IR(CHCl<sub>3</sub>): 3892, 1727, 1435, 1335, 1148/cm.**  
**[α]<sub>D</sub>= +10.7° (CHCl<sub>3</sub>, c=1.38, 23°C).**

**No.1j-29**  
**CDCl<sub>3</sub>, 800MHz**  
**1.00(1H,m), 1.30-1.39(2H,m), 1.48-2.25(12H,m), 2.37(2H,t,J=7.3Hz), 3.17-3.22(5H,m), 3.74-3.79(4H,m), 4.79(1H,d,J=7.8Hz), 5.84-5.84(2H,m).**  
**IR(CHCl<sub>3</sub>): 3470, 3390, 3270, 3075, 1708, 1455, 1420, 1315, 1147/cm.**  
**[α]<sub>D</sub>= +16.8° (CHCl<sub>3</sub>, c=1.42, 23°C).**

**No.1k-1**  
**[α]<sub>D</sub>= -35.4° (CHCl<sub>3</sub>, c=1.06, 23°C).**

No.1k-2  
 $\text{CDCl}_3$ , 300MHz  
 1.07-2.28(14H,m), 2.82(2H,t,J=7.4Hz), 2.83(1H,m), 3.85(5H,s), 3.95(1H,m), 5.80-5.82(2H,m), 6.85(1H,d,J=7.0Hz), 7.45-7.60(8H,m), 7.85-8.02(6H,m).  
 IR( $\text{CHCl}_3$ ): 3438, 3002, 2946, 2858, 1737, 1652, 1514, 1485, 1368, 1310, 1245, 1154 /cm.  
 $[\alpha]_D = -80.4^\circ$  ( $\text{CHCl}_3$ , c=1.01, 24.0°C).

No.1k-3  
 $\text{CDCl}_3$ , 300MHz  
 1.10-2.26(14H,m), 2.37(2H,t,J=7.2Hz), 2.60(1H,m), 3.93(1H,m), 5.80-5.80(2H,m), 6.88(1H,d,J=7.5Hz), 7.46-7.58(3H,m), 7.85-7.99(6H,m).  
 IR( $\text{CHCl}_3$ ): 3448, 3004, 2952, 2874, 1709, 1652, 1515, 1485, 1305, 1155 /cm.  
 $[\alpha]_D = -96.4^\circ$  ( $\text{CHCl}_3$ , c=1.05, 23.0°C).

No.1k-4  
 $\text{CDCl}_3$ , 300MHz  
 1.05-2.17(14H,m), 2.38(2H,t,J=7.2Hz), 2.52(1H,m), 3.81(1H,m), 5.83-5.80(2H,m), 6.08(1H,d,J=7.6Hz), 7.39-7.52(3H,m), 7.57-7.62(6H,m).  
 IR( $\text{CHCl}_3$ ): 3420, 3250, 3008, 2948, 2870, 2660, 2208, 1785(sh), 1705, 1640, 1500/cm.  
 $[\alpha]_D = -21.9 \pm 0.6^\circ$  ( $\text{CHCl}_3$ , c=1.02, 22°C).

No.1k-5  
 $\text{CDCl}_3$ , 300MHz  
 1.05-2.14(14H,m), 2.38(2H,t,J=7.2Hz), 2.51(1H,m), 3.81(1H,m), 5.84-5.46(2H,m), 6.07(1H,d,J=7.6Hz), 7.38-7.56(5H,m).  
 IR( $\text{CHCl}_3$ ): 3432, 3250, 3010, 2950, 2876, 2664, 2558, 2310, 1735(sh), 1705, 1645, 1502, 1441, 1410, 1307, 1276/cm.  
 $[\alpha]_D = -63.6 \pm 1.9^\circ$  ( $\text{CHCl}_3$ , c=0.54, 22°C).

No.1k-6  
 $\text{CDCl}_3$ , 300MHz  
 1.04-2.24(14H,m), 2.88(2H,t,J=7.5Hz), 2.58(1H,m), 3.88(1H,m), 5.80-5.48(2H,m), 6.21(1H,d,J=7.2Hz), 7.41-7.49(3H,m), 7.75-7.77(2H,m).  
 IR( $\text{CHCl}_3$ ): 3447, 3011, 2955, 1706, 1658, 1608, 1578, 1516, 1486, 1457, 1318, 1211, 1164/cm.  
 $[\alpha]_D = -80.8^\circ$  ( $\text{CHCl}_3$ , c=1.00, 23°C).

No.1k-7  
 $\text{CDCl}_3$ , 300MHz  
 1.04-2.22(14H,m), 2.36(2H,t,J=7.2Hz), 2.57(1H,m), 3.87(1H,m), 5.80-5.44(2H,m), 6.17(1H,d,J=8.7Hz), 6.99-7.40(7H,m), 7.73(2H,d,J=7.5Hz).  
 IR( $\text{CHCl}_3$ ): 3449, 3013, 2955, 1789, 1708, 1651, 1609, 1588, 1522, 1487, 1248, 1227, 1169/cm.  
 $[\alpha]_D = -60.2^\circ$  ( $\text{CHCl}_3$ , c=0.92, 23°C).

No.1k-8  
 $\text{CDCl}_3$ , 300MHz  
 1.04-2.35(14H,m), 2.24(2H,t,J=7.5Hz), 2.56(1H,m), 3.87(1H,m), 5.80-5.44(2H,m), 6.19(1H,d,J=7.5Hz), 6.83-6.94(6H,m), 7.69(2H,d,J=8.7Hz).  
 IR( $\text{CHCl}_3$ ): 3599, 3455, 3012, 2965, 1711, 1644, 1604, 1577, 1584, 1507, 1492, 1290, 1286, 1197, 1170/cm.  
 $[\alpha]_D = -47.7^\circ$  ( $\text{CHCl}_3$ , c=1.01, 22°C).

No.1k-9  
 $\text{CDCl}_3$ , 300MHz

1.04-2.20(14H,m),2.81(3H,s),2.86(3H,t,J=7.2Hz),2.56(1H,m),2.86(1H,m),5.8  
0-5.48(2H,m),6.16(1H,d,J=7.2Hz),7.00-7.11(8H,m),7.74(2H,d,J=8.7Hz).  
IR(CHCl<sub>3</sub>):3450,3010,2955,1750,1709,1651,1605,1596,1528,1469,1370,1247,  
1227,1183/cm.  
[α]<sub>D</sub>=-64.7° (CHCl<sub>3</sub>,c=1.01,22°C).

No.1k-10  
CDCl<sub>3</sub> 300MHz  
1.04-2.22(14H,m),2.85(3H,t,J=7.2Hz),2.56(1H,m),2.83(3H,s),2.86(1H,m),5.8  
0-5.48(2H,m),6.17(1H,d,J=6.9Hz),6.89-7.01(8H,m),7.70(2H,d,J=8.7Hz).  
IR(CHCl<sub>3</sub>):3028,2955,1742,1708,1649,1618,1602,1577,1528,1507,1490,1327,  
1210,1170/cm.  
[α]<sub>D</sub>=-58.1° (CHCl<sub>3</sub>,c=1.01,22°C).

No.1m-1  
CDCl<sub>3</sub> 300MHz  
1.06-2.25(14H,m),2.82(2H,t,J=7.4Hz),2.61(1H,m),2.83(3H,s),2.91(1H,m),5.8  
0-5.47(2H,m),6.24(1H,d,J=6.9Hz),7.85-7.89(8H,m),7.58-7.80(4H,m),7.75-7.7  
8(2H,m).  
IR(CHCl<sub>3</sub>):3438,3008,2948,2875,2212,1782,1650,1605,1519,1498/cm.  
[α]<sub>D</sub>= +76° (CHCl<sub>3</sub>,c=1.39,24°C)

No.1m-2  
CDCl<sub>3</sub> 300MHz  
1.05-2.20(14H,m),2.36(2H,t,J=6.2Hz),2.59(1H,m),2.89(1H,m),5.29-5.48(2H,  
m),2.86(1H,d,J=7.0Hz),7.28-7.38(3H,m),7.52-7.60(4H,m),7.73-7.77(2H,m).  
IR(CHCl<sub>3</sub>):3444,3012,2952,2874,2864,2214,1718(sh),1708,1649,1605,1520,1  
498/cm.  
[α]<sub>D</sub>= +91.4° (CHCl<sub>3</sub>,c=1.01,22°C)

No.1m-3  
CDCl<sub>3</sub> 300MHz  
1.06-2.38(14H,m),2.82(2H,t,J=7.0Hz),2.62(1H,m),2.63(3H,s),2.93(1H,m),5.8  
0-5.50(2H,m),6.26(1H,d,J=7.0Hz),7.28-7.51(3H,m),7.58-7.67(4H,m),7.92-7.8  
8(2H,m).  
IR(CHCl<sub>3</sub>):3438,3008,2948,2875,1783(w),1727,1650,1608,1580(w),1523,150  
1,1482/cm.  
[α]<sub>D</sub>= +59° (CHCl<sub>3</sub>,c=1.49,25°C)

No.1m-4  
CDCl<sub>3</sub> 300MHz  
1.08-2.25(14H,m),2.36(2H,t,J=7.4Hz),2.59(1H,m),2.61(1H,m),5.29-5.48(3H,  
m),2.89(1H,d,J=7.4Hz),7.28-7.50(3H,m),7.51-7.67(4H,m),7.81-7.86(2H,m).  
IR(CHCl<sub>3</sub>):3436,3010,2948,2868,1727,1715(sh),1649,1618(w),1524,1502,14  
82,1372/cm.  
[α]<sub>D</sub>= +72° (CHCl<sub>3</sub>,c=0.98,25°C)

No.1m-5  
CDCl<sub>3</sub> 300MHz  
1.09-2.20(14H,m),2.33(3H,t,J=7.2Hz),2.68(1H,m),2.68(3H,s),2.92(1H,m),5.8  
1-5.51(2H,m),6.35(1H,d,J=7.0Hz),7.51-7.60(3H,m),7.92-7.97(2H,m).  
IR(CHCl<sub>3</sub>):3436,3008,2948,2875,1727,1652,1608(w),1515,1484/cm.  
[α]<sub>D</sub>= +82° (CHCl<sub>3</sub>,c=0.99,25°C)

No.1m-6  
CDCl<sub>3</sub> 300MHz  
1.09-2.38(14H,m),2.37(2H,t,J=7.2Hz),2.60(1H,m),2.92(1H,m),5.20-5.49(2H,  
m),2.82(1H,d,J=7.4Hz),7.51-7.55(3H,m),7.55-7.58(3H,m).

IR(CHCl<sub>3</sub>): 3438, 3010, 2950, 2878, 2870, 1727, 1718(ab), 1650, 1608(w), 1515, 148

4/cm.

[α]<sub>D</sub> = +84° (CHCl<sub>3</sub>, c=1.84, 25°C)

No.1m - 7

CDCl<sub>3</sub>, 800MHz

1.03-2.16(14H,m), 2.32(3H,t,J=7.4Hz), 2.59(1H,m), 3.64(3H,s), 3.89(1H,m), 5.2  
9-5.49(2H,m), 6.16(1H,d,J=7.8Hz), 6.98-7.08(4H,m), 7.14-7.20(1H,m), 7.34-7.4  
1(2H,m), 7.73-7.78(2H,m).

IR(CHCl<sub>3</sub>): 3438, 3008, 2946, 2868, 1727, 1648, 1610, 1596, 1519, 1485/cm.

[α]<sub>D</sub> = +84° (CHCl<sub>3</sub>, c=1.29, 25°C).

No.1m - 8

CDCl<sub>3</sub>, 800MHz

1.06-2.21(14H,m), 2.36(2H,t,J=7.5Hz), 2.56(1H,m), 3.66(1H,m), 3.89(1H,m), 5.31-5.46(2H,  
m), 6.17(1H,d,J=8.9Hz), 6.99-7.08(4H,m), 7.15-7.21(1H,m), 7.35-7.41(3H,m), 7.  
72-7.75(2H,m).

IR(CHCl<sub>3</sub>): 3438, 3010, 2946, 2868, 2678, 1730(ab), 1709, 1647, 1608, 1586, 1520, 1  
485/cm.

[α]<sub>D</sub> = +56° (CHCl<sub>3</sub>, c=0.97, 25°C)

No.1m - 9

CDCl<sub>3</sub>, 800MHz

1.06-2.18(14H,m), 2.29-2.84(5H,m), 2.59(1H,m), 3.64(3H,s), 3.89(1H,m), 5.32-5.  
46(2H,m), 6.16(1H,d,J=7.5Hz), 7.00-7.11(6H,m), 7.74-7.77(2H,m).

IR(CHCl<sub>3</sub>): 3440, 3010, 2946, 2868, 1729, 1649, 1696, 1519, 1488/cm.

[α]<sub>D</sub> = +47° (CHCl<sub>3</sub>, c=0.82, 25°C).

No.1m - 10

CDCl<sub>3</sub>, 800MHz

1.04-2.20(14H,m), 2.31-2.89(5H,m), 2.57(1H,m), 3.87(1H,m), 5.33-5.47(2H,m),  
6.17(1H,d,J=7.0Hz), 6.99-7.12(6H,m), 7.72-7.78(2H,m).

IR(CHCl<sub>3</sub>): 3674, 3572, 3438, 3010, 2946, 2868, 2628, 1748, 1710, 1648, 1618, 1595,  
1520, 1489/cm.

[α]<sub>D</sub> = +51° (CHCl<sub>3</sub>, c=0.91, 25°C)

No.1m - 11

CDCl<sub>3</sub>, 800MHz

1.04-2.16(14H,m), 2.31(2H,t,J=7.2Hz), 2.59(1H,m), 3.63(3H,s), 3.89(1H,m), 5.2  
9-5.49(2H,m), 6.24(1H,d,J=7.4Hz), 6.54(1H,s), 6.88-6.98(6H,m), 7.69-7.75(2H,  
m).

IR(CHCl<sub>3</sub>): 3674, 3588, 3438, 3296, 3010, 2946, 2868, 1726, 1646, 1608, 1520, 1504,  
1489/cm.

[α]<sub>D</sub> = +51° (CHCl<sub>3</sub>, c=0.91, 25°C)

No.1m - 12

CDCl<sub>3</sub>, 800MHz

1.04-2.21(14H,m), 2.33(3H,t,J=8.0Hz), 2.66(1H,m), 2.87(1H,m), 5.28-5.45(2H,  
m), 5.38(1H,d,J=8.0Hz), 6.75(1H,m), 6.87-6.94(6H,m), 7.66-7.71(2H,m), 9.63(1  
H,bs).

IR(CHCl<sub>3</sub>): 3674, 3582, 3436, 3275, 3010, 2960, 2868, 3675, 1727, 1710(ab), 1643, 1  
608, 1522, 1504, 1490/cm.

[α]<sub>D</sub> = +30° (CHCl<sub>3</sub>, c=0.97, 25°C)

No.1m - 13

CDCl<sub>3</sub>, 800MHz

1.01-2.18(14H,m), 2.31(3H,t,J=7.4Hz), 2.58(1H,m), 3.68(3H,s), 3.82(3H,s), 3.89  
(1H,m), 5.29-5.48(2H,m), 6.14(1H,d,J=7.0Hz), 6.88-7.08(6H,m), 7.70-7.74(2H,

m).

IR(CHCl<sub>3</sub>):3442,3403,3004,2946,2868,1727,1648,1600,1518,1499/cm.

[α]<sub>D</sub>=+42° (CHCl<sub>3</sub>,c=1.82,25°C)

No.1m-14

CDCl<sub>3</sub> 300MHz

1.05-2.21(14H,m),2.85(3H,t,J=7.2Hz),2.55(1H,m),2.82(3H,s),2.88(1H,m),5.2  
7-8.48(2H,m),6.16(1H,d,J=7.2Hz),6.88-7.03(8H,m),7.68-7.78(2H,m).

IR(CHCl<sub>3</sub>):3438,3012,2948,2870,2850,1780(sh),1709,1647,1615(sh),1601,15  
19,1492/cm.

[α]<sub>D</sub>=+64° (CHCl<sub>3</sub>,c=0.70,25°C)

No.1m-15

CDCl<sub>3</sub> 300MHz

1.05-2.20(14H,m),2.29-2.36(5H,m),2.62(1H,m),2.88(3H,s),3.92(1H,m),5.20-6.  
50(2H,m),6.25(1H,d,J=7.2Hz),7.16-7.21(2H,m),7.59-7.64(4H,m),7.88-7.87(2  
H,m).

IR(CHCl<sub>3</sub>):3446,3010,2946,2868,1745(sh),1788,1650,1615,1526,1507,1488/c  
m.

[α]<sub>D</sub>=+65.0° (CHCl<sub>3</sub>,c=1.02,23°C)

No.1m-16

CDCl<sub>3</sub> 300MHz

1.08-2.21(14H,m),2.84-2.40(5H,m),2.59(1H,m),3.90(1H,m),5.29-5.48(2H,m),  
6.29(1H,d,J=7.0Hz),7.18(2H,d,J=8.6Hz),7.58-7.64(4H,m),7.88(2H,d,J=8.2Hz  
).

IR(CHCl<sub>3</sub>):3438,3012,2948,2870,2822,1749,1710,1649,1610,1526,1508,1487/  
cm.

[α]<sub>D</sub>=+66° (CHCl<sub>3</sub>,c=1.21,24°C)

No.1m-17

CDCl<sub>3</sub> 300MHz

1.06-2.19(14H,m),2.32(3H,t,J=7.2Hz),2.62(1H,m),2.88(3H,s),2.93(1H,m),5.8  
0-5.50(2H,m),6.82(1H,d,J=7.6Hz),6.41(1H,s),6.94(2H,d,J=9.0Hz),7.47(2H,d,  
J=9.0Hz),7.58(2H,d,J=8.6Hz),7.51(2H,d,J=8.6Hz).

IR(CHCl<sub>3</sub>):3550,3434,3284,3010,2946,2868,1726,1646,1606,1528,1490/cm. [  
α]<sub>D</sub>=+62.4° (CHCl<sub>3</sub>,c=1.01,22°C)

No.1m-18

CDCl<sub>3</sub>-CD<sub>3</sub>OD 300MHz

1.11-2.18(14H,m),2.82(2H,t,J=7.4Hz),2.59(1H,m),2.88(1H,m),5.20-5.49(2H,  
m),6.86(1H,d,J=7.0Hz),6.92(2H,d,J=8.6Hz),7.47(2H,d,J=8.6Hz),7.59(2H,d,J  
=8.6Hz),7.79(2H,d,J=8.2Hz).

IR(Nujol):3898,3175,2725,1696,1635,1601,1581,1510/cm.

[α]<sub>D</sub>=+99.5° (CH<sub>3</sub>OH,c=1.011,25°C)

No.1m-19

CDCl<sub>3</sub> 300MHz

1.05-2.20(14H,m),2.32(3H,t,J=7.4Hz),2.61(1H,m),2.88(3H,s),2.88(3H,s),3.94  
(1H,m),5.20-5.50(2H,m),6.24(1H,d,J=7.0Hz),6.99(2H,d,J=8.6Hz),7.53-7.63(4  
H,m),7.82(2H,d,J=8.6Hz).

IR(CHCl<sub>3</sub>):3440,3006,2946,2875,1726,1649,1606,1527,1510,1489/cm.

[α]<sub>D</sub>=+65° (CHCl<sub>3</sub>,c=0.88,25°C)

No.1m-20

CDCl<sub>3</sub> 300MHz

1.09-2.20(14H,m),2.85(3H,t,J=7.3Hz),2.56(1H,m),2.85(3H,s),2.89(1H,m),5.2  
5-5.48(2H,m),6.85(1H,d,J=7.2Hz),6.98(2H,d,J=8.6Hz),7.51-7.61(4H,m),7.81(

2H, d, J=8.4Hz), 8.34(1H, brs).

IR(CHCl<sub>3</sub>): 3446, 3012, 2952, 2881, 2840, 1780(ab), 1707, 1647, 1608, 1527, 1510, 1

489/cm.

[α]<sub>D</sub>=+55° (CHCl<sub>3</sub>, c=1.00, 25°C).

No.1m - 2 1

CDCl<sub>3</sub>, 300MHz

1.05-2.14(14H,m), 2.37(3H,t,J=7.2Hz), 2.51(1H,m), 2.61(1H,m), 2.84-5.46 H, m), 6.11(1H,d,J=7.5Hz), 7.38-7.48(3H,m), 7.53-7.55(3H,m).

IR(CHCl<sub>3</sub>): 3420, 3250, 3008, 2948, 2870, 2860, 2810, 1785(ab), 1705, 1645, 1608, 1

441, 1409/cm.

[α]<sub>D</sub>=+59.2±1.0° (CHCl<sub>3</sub>, c=1.028, 22°C).

No.1m - 2 2

CDCl<sub>3</sub>, 300MHz

1.05-2.17(14H,m), 2.37(2H,t,J=7.2Hz), 2.52(1H,m), 2.63(1H,m), 2.82-5.47(3H, m), 6.20(1H,d,J=7.6Hz), 7.38-7.53(3H,m), 7.58-7.61(3H,m), 8.11(1H,brs).

IR(CHCl<sub>3</sub>): 3420, 3250, 3010, 2984, 2870, 2875, 2808, 1780(ab), 1705, 1640, 1500, 1

406/cm.

[α]<sub>D</sub>=+57.4° (CHCl<sub>3</sub>, c=1.83, 22°C).

No.1m - 2 3

CDCl<sub>3</sub>, 300MHz

1.05-2.18(14H,m), 2.31(2H,t,J=7.5Hz), 2.60(1H,m), 2.68(3H,s), 2.90(1H,m), 2.8

2-5.47(3H,m), 6.22(1H,d,J=8.9Hz), 7.40-7.49(2H,m), 7.76-7.79(2H,m).

IR(CHCl<sub>3</sub>): 3436, 3008, 2946, 2868, 1727, 1651, 1603, 1595, 1512, 1484/cm.

[α]<sub>D</sub>=+52° (CHCl<sub>3</sub>, c=1.49, 25°C).

No.1m - 2 4

CDCl<sub>3</sub>, 300MHz

1.05-2.21(14H,m), 2.36(2H,t,J=7.2Hz), 2.57(1H,m), 2.89(1H,m), 2.95-5.47(2H, m), 6.23(1H,d,J=7.0Hz), 7.39-7.55(3H,m), 7.73-7.79(2H,m).

IR(CHCl<sub>3</sub>): 3676, 3572, 3486, 3010, 2948, 2875, 1720(ab), 1709, 1650, 1600, 1580, 1

514, 1484/cm.

[α]<sub>D</sub>=+57° (CHCl<sub>3</sub>, c=0.97, 25°C).

No.1m - 2 5

CDCl<sub>3</sub>, 300MHz

1.04-2.18(14H,m), 2.38-2.35(5H,m), 2.59(1H,m), 2.62(3H,s), 2.88(1H,m), 2.99-5.

49(2H,m), 6.20(1H,d,J=7.2Hz), 7.15(2H,d,J=9.0Hz), 7.80(2H,d,J=8.6Hz).

IR(CHCl<sub>3</sub>): 3486, 3010, 2946, 2868, 1752, 1727, 1658, 1602, 1519, 1491/cm.

[α]<sub>D</sub>=+58° (CHCl<sub>3</sub>, c=1.68, 25°C).

No.1m - 2 6

CDCl<sub>3</sub>, 300MHz

1.05-2.19(14H,m), 2.33-2.38(5H,m), 2.56(1H,m), 2.88(1H,m), 2.99-5.47(2H,m),

6.25(1H,d,J=7.4Hz), 7.15(2H,d,J=9.0Hz), 7.78(2H,d,J=8.6Hz).

IR(CHCl<sub>3</sub>): 3434, 3016, 3008, 2948, 2880, 2823, 1752, 1780(ab), 1710, 1651, 1605, 1

520, 1492/cm.

[α]<sub>D</sub>=+68° (CHCl<sub>3</sub>, c=3.68, 24°C)

No.1m - 2 7

CDCl<sub>3</sub>, 300MHz

1.05-2.16(14H,m), 2.30(2H,t,J=7.5Hz), 2.57(1H,m), 2.62(3H,s), 2.87(1H,m), 2.

7-5.47(2H,m), 6.22(1H,d,J=7.4Hz), 6.55(2H,d,J=8.6Hz), 7.62 H,d,J=8.6Hz), 8.

86(1H,s).

IR(CHCl<sub>3</sub>): 3580, 3450, 3216, 3010, 2948, 2868, 1726, 1640, 1608, 1584, 1528, 1496/

cm.

$[\alpha]_D = +58.2^\circ$  ( $\text{CHCl}_3, c=0.718, 23^\circ\text{C}$ )

No.1m - 28

$\text{CDCl}_3$  300MHz

1.10-2.25(14H,m), 2.82(2H,t,J=7.3Hz), 2.85(1H,brs), 3.82-3.98(1H,m), 5.27-5.47(2H,m), 6.36(1H,d,J=7.4Hz), 6.86(2H,d,J=8.6Hz), 7.69(2H,d,J=8.6Hz).  
IR( $\text{CHCl}_3$ ): 3488, 2942, 2875, 1780(sh), 1708, 1689, 1607, 1585/cm.

No.1m - 29

$\text{CDCl}_3$  300MHz

1.05-2.18(14H,m), 2.81(2H,t,J=7.4Hz), 2.86(1H,m), 3.84(3H,s), 3.85(3H,s), 3.89(1H,m), 5.29-5.48(2H,m), 6.14(1H,d,J=8.6Hz), 6.92(2H,d,J=9.0Hz), 7.74(2H,d,J=9.0Hz).

IR( $\text{CHCl}_3$ ): 3445, 3008, 2946, 2868, 1727, 1646, 1608, 1578, 1528, 1498/cm.  
 $[\alpha]_D = +53^\circ$  ( $\text{CHCl}_3, c=2.08, 24^\circ\text{C}$ )

No.1m - 30

$\text{CDCl}_3$  300MHz

1.04-2.21(14H,m), 2.86(2H,t,J=7.3Hz), 2.86(1H,m), 3.85(3H,s), 3.88(1H,m), 5.27-5.46(2H,m), 6.15(1H,d,J=7.2Hz), 6.92(2H,d,J=8.6Hz), 7.78(2H,d,J=8.6Hz)  
IR( $\text{CHCl}_3$ ): 3440, 3010, 2950, 2870, 2845, 1727, 1710(sh), 1646, 1608, 1578, 1524, 1494/cm.

$[\alpha]_D = +62^\circ$  ( $\text{CHCl}_3, c=1.10, 24^\circ\text{C}$ ).

No.1m - 31

$\text{CDCl}_3 + \text{CD}_3\text{OD}$  300MHz

1.18-2.20(14H,m), 2.81(2H,t,J=7.3Hz), 2.89(1H,m), 3.85(1H,m), 5.31-5.51(2H,m), 7.18-7.21(1H,m), 7.81-7.42(2H,m), 7.88-7.98(2H,m).  
IR( $\text{CHCl}_3$ ): 3344, 3175, 2715, 2875, 1699, 1681, 1566/cm.

$[\alpha]_D = +67^\circ$  ( $\text{CH}_3\text{OH}, c=1.01, 24^\circ\text{C}$ ).

No.1m - 32

$\text{CDCl}_3$  300MHz

1.09-2.23(14H,m), 2.88(2H,t,J=7.1Hz), 2.87(1H,brs), 3.40-3.88(9H,m), 4.41(1H,brs), 5.29-5.48(2H,m), 6.44(1H,d,J=7.4Hz), 7.48(2H,d,J=8.2Hz), 7.80(2H,d,J=7.8Hz).

IR( $\text{CHCl}_3$ ): 3434, 3354, 1726, 1720(sh), 1660(sh), 1628/cm.

No.1m - 33

$\text{CDCl}_3$  200MHz

1.14-2.25(14H,m), 2.87(2H,t,J=7.3Hz), 2.84(1H,brs), 3.93-4.01(1H,m), 5.30-5.51(2H,m), 6.47(1H,d,J=7.4Hz), 7.83-7.74(2H,m), 7.79(3H,s), 7.89-7.98(1H,m), 8.00(1H,d,J=2.8, 1.0Hz), 8.80(1H,d,J=1.0Hz), 8.65-8.73(2H,m).

IR( $\text{CHCl}_3$ ): 3460, 2878, 1728, 1707, 1649, 1528, 1509/cm.

$[\alpha]_D = +52.8 \pm 1.2^\circ$  ( $\text{CHCl}_3, c=1.01, 28^\circ\text{C}$ ).

No.2a-1

$[\alpha]_D = +69.0^\circ$  ( $\text{MeOH}, c=1.01, 28^\circ\text{C}$ )

No.2a-2

$\text{CDCl}_3$  300MHz

0.99(1H,d,J=10.2Hz), 1.15-1.24(2H, d,J=10.2Hz), 1.50-2.50(14H,m), 4.30(1H,m), 5.85-5.82(2H,m), 6.32(1H,d,J=8.7Hz), 7.86-7.49(3H,m), 7.66-7.62(3H,m), 7.66-7.80(2H, d,J=8.7Hz).

IR( $\text{CHCl}_3$ ): 3116, 3014, 2926, 2870, 2868, 1708, 1651, 1610, 1524, 1504, 1484, 1473/cm.

$[\alpha]_D = +64.1^\circ$  ( $\text{MeOH}, c=1.02, 28^\circ\text{C}$ ).

No.2a-5

$[\alpha]_D = +76.6^\circ$  (MeOH, c=1.18, 26°C).

No.2a-4

CDCl<sub>3</sub>, 300MHz

0.99(1H,d,J=10.2Hz),1.18 δ 1.25(z<sub>1</sub>z<sub>2</sub> 3H,z<sub>1</sub>z<sub>2</sub> s),1.64-2.51(14H,m),4.3  
1(1H,m),5.36-5.52(2H,m),6.23(1H,d,J=8.4Hz),7.50-7.56(3H,m),7.55-7.56(6H,  
m).

IR(CHCl<sub>3</sub>):3518,3452,3014,2925,2870,1740,1708,1654,1517,1488,147 /cm.  
 $[\alpha]_D = +79.5^\circ$  (MeOH, c=1.18, 22°C).

No.2a-5

CD<sub>3</sub>OD, 300MHz

0.98(1H,d,J=9.9Hz),1.18 δ 1.25(z<sub>1</sub>z<sub>2</sub> 3H,z<sub>1</sub>z<sub>2</sub> s),1.56-1.71(3H,m),1.98-2.  
40(11H,m),4.17(1H,m),5.41-5.52(2H,m),7.53-7.56(3H,m),7.91-8.01(6H,m).  
IR(KBr):3418,3063,2983,2921,2869,1704,1642,1566,1518,1488,1406 /cm.  
 $[\alpha]_D = +82.0^\circ$  (MeOH, c=1.00, 25°C).

No.2a-6

$[\alpha]_D = +64.1^\circ$  (MeOH, c=1.01, 25°C).

No.2a-7

$[\alpha]_D = +65.3^\circ$  (MeOH, c=0.99, 25°C).

No.2a-8

$[\alpha]_D = +74.0^\circ$  (MeOH, c=1.01, 25°C).

No.2a-9

$[\alpha]_D = +71.0^\circ$  (MeOH, c=1.10, 25°C).

No.2a-10

$[\alpha]_D = +74.7^\circ$  (MeOH, c=1.00, 25°C).

No.2a-11

$[\alpha]_D = +72.1^\circ$  (MeOH, c=1.00, 25°C).

No.2a-12

$[\alpha]_D = +59.1^\circ$  (CHCl<sub>3</sub>, c=1.01, 26°C).

m.p.155.0-156.0°C

No.2a-13

CDCl<sub>3</sub>, 300MHz

0.98(1H,d,J=10.2Hz),1.18 δ 1.25(z<sub>1</sub>z<sub>2</sub> 3H,z<sub>1</sub>z<sub>2</sub> s),1.63-2.40(14H,m),4.3  
0(1H,m),5.46-5.56(2H,m),6.44(1H,d,J=8.4Hz),7.49 δ 7.77(z<sub>1</sub>z<sub>2</sub> 2H,z<sub>1</sub>z<sub>2</sub>  
d,J=8.7Hz),7.54(1H,s).

IR(CHCl<sub>3</sub>):3689,3378,3028,3014,2924,1718,1652,1602,1523,1498 /cm.

$[\alpha]_D = +78.3^\circ$  (MeOH, c=0.84, 25°C).

m.p.205.0-206.0°C

No.2a-14

$[\alpha]_D = +72.5^\circ$  (MeOH, c=1.07, 25°C).

No.2a-15

CDCl<sub>3</sub>, 300MHz

0.99(1H,d,J=9.9Hz),1.14 δ 1.24(z<sub>1</sub>z<sub>2</sub> 3H,z<sub>1</sub>z<sub>2</sub> s),1.58-2.44(14H,m),4.37(1H,m),5.30-5.50(2H,m),6.29(1H,d,J=9.0Hz),7.11 δ 7.20(z<sub>1</sub>z<sub>2</sub> 1H,z<sub>1</sub>z<sub>2</sub> d,  
J=16.2Hz),7.39-7.55(5H,m),7.57 δ 7.72(z<sub>1</sub>z<sub>2</sub> 2H,z<sub>1</sub>z<sub>2</sub> d,J=8.7Hz).

IR(CHCl<sub>3</sub>):3458,3063,2983,2922,2818,2925,2870,1706,1650,1607,1560,1522,1498

/cm.

$[\alpha]_D = +72.8^\circ$  (MeOH, c=1.00, 27°C).

m.p. 115.0-117.0°C

No.2a-16

CDCl<sub>3</sub> 300MHz

0.93(1H,d,J=10.2Hz),1.11 1.23(2H,2H,2H,a),1.50-2.48(14H,m),3.6  
2(8H,s),4.29(1H,m),6.30-6.50(2H,m),6.70(1H,d,J=8.7Hz),6.88 6.88  
(2H,a) 1H, 2H, d,J=12.3Hz),7.23(5H,s),7.29 7.59(2H,2H,2H,d,J=8.  
1Hz).

IR(CHCl<sub>3</sub>):3458,3024,2916,2924,2870,1730,1651,1607,1520,1495 /cm.

$[\alpha]_D = +56.8^\circ$  (MeOH, c=1.04, 24°C).

No.2a-17

CDCl<sub>3</sub> 300MHz

0.97(1H,d,J=10.2Hz),1.11 1.23(2H,2H,2H,a),1.50-2.38(14H,m),4.2  
6(1H,m),5.30-5.50(2H,m),6.23(1H,d,J=8.4Hz),6.89 6.70(2H,1H,2H,  
d,J=12.3Hz),7.23(5H,s),7.30 7.57(2H,2H,2H,d,J=8.7Hz).

IR(CHCl<sub>3</sub>):3452,3081,3019,3014,2925,2870,2665,1708,1650,1607,1521,1495  
/cm.

$[\alpha]_D = +61.6^\circ$  (MeOH, c=1.00, 27°C).

No.2a-18

CDCl<sub>3</sub> 300MHz

0.97(1H,d,J=10.2Hz),1.11 1.23(2H,2H,2H,a),1.50-2.50(14H,m),3.61  
(3H,s),4.31(1H,m),5.35-5.51(2H,m),6.88(1H,d,J=8.4Hz),7.48-7.64(4H,m),7.7  
9-7.83(2H,m),7.91(1H,dt,J=1.5 and 7.8Hz),8.01(1H,dt,J=1.5 7.8Hz),8.  
18(1H,t,J=1.8Hz).

IR(CHCl<sub>3</sub>):3450,3026,3018,2925,2870,1730,1659,1600,1510 /cm.

$[\alpha]_D = +56.0^\circ$  (MeOH, c=1.01, 25°C).

No.2a-19

CDCl<sub>3</sub> 300MHz

0.95(1H,d,J=9.9Hz),1.14 1.21(2H,2H,2H,a),1.53-2.60(14H,m),4.25(1H,m),5.35-5.64(3H,m),7.21(1H,d,J=7.8Hz),7.49-7.68(4H,m),7.76-7.84(3H,m)  
,8.25(1H,m),8.43(1H,m).

IR(CHCl<sub>3</sub>):3882,3190,3025,3018,2925,2870,1725,1652,1599,1577,1521 /cm.

$[\alpha]_D = +55.9^\circ$  (MeOH, c=1.00, 25°C).

No.2a-20

CDCl<sub>3</sub> 300MHz

0.98(1H,d,J=10.2Hz),1.13 1.24(2H,2H,2H,a),1.50-2.50(14H,m),3.6  
2(3H,s),4.31(1H,m),5.35-5.51(2H,m),6.24(1H,d,J=8.4Hz),7.40-7.53(3H,m),7.  
71-7.76(2H,m).

IR(CHCl<sub>3</sub>):3458,3026,3018,2925,2870,1730,1753,1579,1514,1486 /cm.

$[\alpha]_D = +61.2^\circ$  (MeOH, c=1.04, 25°C).

No.2a-21

CDCl<sub>3</sub> 300MHz

0.98(1H,d,J=10.2Hz),1.13 1.23(2H,2H,2H,a),1.53-2.50(14H,m),4.2  
8(1H,m),5.34-5.51(2H,m),6.27(1H,d,J=8.7Hz),7.41-7.68(3H,m),7.71-7.74(2H,  
m).

IR(CHCl<sub>3</sub>):3452,3068,3027,3014,2925,2871,1708,1652,1578,1518,1488 /cm.

$[\alpha]_D = +62.0^\circ$  (MeOH, c=1.01, 27°C).

No.2a-22

d<sub>6</sub>-DMSO 300MHz

0.88(1H,d,J=9.9Hz),1.10 1.16(2H,2H,2H,a),1.48-1.63(8H,m),1.85-2.

49(1H,m),8.98(1H,m),5.23-5.48(2H,m),7.41(8H,m),7.86(2H,d,J=8.8Hz),8.19  
(1H,d,J=8.8Hz).  
IR(KBr):3867,3060,2984,2922,2868,1884,1563,1529,1487/cm.  
[α]<sub>D</sub>=+47.7° (MeOH,c=1.00,25°C).

No.2a-22  
[α]<sub>D</sub>=+62.7° (MeOH,c=1.01,27°C).

No.2a-24  
CDCl<sub>3</sub>, 300MHz  
0.99(1H,d,J=10.2Hz),1.14 δ 1.25(2H,2H,2H,s),1.52-2.50(14H,m),4.3  
1(1H,m),5.26-5.52(2H,m),6.34(1H,d,J=8.4Hz),7.47-7.52(2H,m),7.59-7.64(1H,  
m),7.78-7.88(2H,m).  
IR(CHCl<sub>3</sub>):3449,3027,2918,2925,2869,1708,1656,1599,1518,1483 /cm.  
[α]<sub>D</sub>= +68.1° (MeOH,c=1.00,25°C).

No.2a-25  
[α]<sub>D</sub>=+85.1° (MeOH,c=1.00,25°C).

No.2a-26  
[α]<sub>D</sub>=+35.5° (MeOH,c=1.02,25°C).

No.2a-27  
CDCl<sub>3</sub>, 300MHz  
0.97(1H,d,J=10.2Hz),1.12 δ 1.23(2H,2H,2H,s),1.52-2.50(14H,m),8.6  
3(3H,s),4.29(1H,m),5.26-5.51(2H,m),6.18(1H,d,J=8.4Hz),7.01 δ 7.71  
(2H,2H,2H,s),6.98-7.08(2H,m),7.18(1H,t,J=7.5Hz),7.34-7.41(2  
H,m).  
IR(CHCl<sub>3</sub>):3455,3024,3016,2924,2870,1780,1651,1588,1520,1487 /cm.  
[α]<sub>D</sub>=+88.4° (MeOH,c=1.01,25°C).

No.2a-28  
CDCl<sub>3</sub>, 300MHz  
0.98(1H,d,J=10.2Hz),1.12 δ 1.28(2H,2H,2H,s),1.52-2.50(14H,m),4.2  
6(1H,m),5.24-5.51(2H,m),6.20(1H,d,J=8.0Hz),7.01 δ 7.70(2H,2H,  
d,J=9.0Hz),6.98-7.15(2H,m),7.17(1H,t,J=7.5Hz),7.34-7.40(2H,m).  
IR(CHCl<sub>3</sub>):3454,3021,3018,2926,2870,1708,1650,1588,1528,1487/cm.  
[α]<sub>D</sub>= +86.2° (MeOH,c=1.00,25°C).

No.2a-29  
[α]<sub>D</sub>=+88.0° (MeOH,c=1.03,25°C).

No.2a-30  
CDCl<sub>3</sub>, 300MHz  
0.97(1H,d,J=10.2Hz),1.10 δ 1.28(2H,2H,2H,s),1.52-2.50(14H,m),4.2  
6(1H,m),5.20-5.50(2H,m),6.28(1H,d,J=8.7Hz),6.36(1H,s),7.56-7.59(10H,m),7.  
60 δ 7.68(2H,2H,s),7.70(d,J=8.4Hz).  
IR(CHCl<sub>3</sub>):3451,3008,2964,2929,2914,2865,2869,1707,1653,1523,1495 /cm.  
[α]<sub>D</sub>=+84.2° (MeOH,c=1.00,25°C).

No.2a-31  
CDCl<sub>3</sub>, 300MHz  
0.98(1H,d,J=10.2Hz),1.14 δ 1.24(2H,2H,2H,s),1.50-2.50(14H,m),8.6  
3(3H,s),4.81(1H,m),5.20-5.50(2H,m),6.26(1H,d,J=8.4Hz),6.90(1H,t,J=7.4Hz),  
7.18(1H,d,J=8.7Hz),7.29(2H,t,J=8.0Hz),7.57-7.76(5H,m),7.82(1H,s).  
IR(ν<sub>max</sub>):3860,3244,1728,1638,1601,1578,1535,1495 /cm.  
[α]<sub>D</sub>=+78.6° (MeOH,c=0.50,26°C).  
m.p.158.0-184.0°C

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No.2a-32

$[\alpha]_D = +56.1^\circ$  (MeOH, c=1.02, 26°C).

No.2a-33

CDCl<sub>3</sub> 300MHz

0.95(1H,d,J=10.2Hz), 1.10 和 1.21(各2H, 叠加 s), 1.50-2.50(14H,m), 4.25  
(1H,m), 5.13(2H,s), 5.80-5.70(3H,m), 6.41(1H,d,J=8.2Hz), 6.89(1H,s), 7.09(1H,  
s), 7.17 和 7.72(各2H, 叠加 d,J=8.2Hz), 7.82(1H,s).  
IR(CHCl<sub>3</sub>): 3450, 3125, 3081, 3018, 2925, 2870, 2467, 1917, 1708, 1684, 1615, 1575,  
1523, 1497 /cm.

$[\alpha]_D = +55.3^\circ$  (MeOH, c=1.01, 26°C).

No.2a-34

$[\alpha]_D = +72.9^\circ$  (MeOH, c=1.08, 25°C).

No.2a-35

CDCl<sub>3</sub> 300MHz

0.98(1H,d,J=10.2Hz), 1.13 和 1.24(各2H, 叠加 s), 1.52-2.48(14H,m), 4.2  
8(1H,m), 5.88-5.81(2H,m), 6.38(1H,d,J=8.7Hz), 7.84-7.87(3H,m), 7.52-7.55(2H,  
m), 7.58 和 7.71(各2H, 叠加 d,J=8.7Hz).

IR(CHCl<sub>3</sub>): 3616, 3452, 3030, 3012, 2925, 2870, 1738, 1708, 1682, 1607, 1555, 1521,  
1497 /cm.

$[\alpha]_D = +74.8^\circ$  (MeOH, c=1.01, 25°C).

No.2a-36

$[\alpha]_D = +23.4^\circ$  (MeOH, c=1.07, 25°C).

No.2a-37

CDCl<sub>3</sub> 300MHz

0.88(1H,d,J=10.5Hz), 0.95 和 1.18(各2H, 叠加 s), 1.44-2.46(14H,m), 3.9  
2(1H,m), 5.84-5.52(2H,m), 7.36-7.54(3H,m), 7.68(1H,s).  
IR(CHCl<sub>3</sub>): 3482, 3310, 3189, 3028, 3014, 2924, 2870, 1704, 1610, 1594, 1523, 1487  
/cm.

$[\alpha]_D = +25.5^\circ$  (MeOH, c=1.00, 25°C).

No.2a-38

$[\alpha]_D = +70.9^\circ$  (MeOH, c=1.02, 25°C).

No.2a-39

$[\alpha]_D = +70.6^\circ$  (MeOH, c=1.01, 25°C).

No.2a-40

$[\alpha]_D = +74.7^\circ$  (MeOH, c=1.00, 25°C).

No.2a-41

$[\alpha]_D = +72.1^\circ$  (MeOH, c=1.01, 24°C).

No.2a-42

$[\alpha]_D = +69.2^\circ$  (MeOH, c=1.00, 25°C).

No.2a-43

$[\alpha]_D = +70.8^\circ$  (MeOH, c=1.00, 25°C).

No.2a-44

$[\alpha]_D = +60.4^\circ$  (MeOH, c=1.00, 25°C).

No.2a-45

$\text{CDCl}_3$  800MHz

0.97(1H,d,J=9.0Hz),1.13  $\delta$  1.23(  $\text{z}=\text{z}$ ; 3H,  $\text{z}=\text{z}$  s),1.55-2.52(14H,m),4.39(1H,m),5.35-5.54(2H,m),6.38(1H,d,J=9.0Hz),7.10(1H,t,J=7.4Hz),7.34(2H,t,J=7.4Hz),7.52(2H,m),7.68  $\delta$  7.75(  $\text{z}=\text{z}$ ; 3H,  $\text{z}=\text{z}$  d,J=8.4Hz),7.80(1H,s),8.10(1H,s),10.09(1H,s).

IR( $\text{CHCl}_3$ ):3393,2198,8093,3033,2018,2925,2870,1698,1654,1598,1587,1498/cm.

$[\alpha]_D=-59.4^\circ$  (MeOH, $c=1.01,24^\circ\text{C}$ ).

No.2a-46

$[\alpha]_D=-63.5^\circ$  (MeOH, $c=1.00,25^\circ\text{C}$ ).

No.2a-47

$\text{CDCl}_3$  800MHz

0.97(1H,d,J=9.0Hz),1.13  $\delta$  1.23(  $\text{z}=\text{z}$ ; 3H,  $\text{z}=\text{z}$  s),1.54-2.48(14H,m),4.39(1H,m),5.35-5.52(2H,m),6.32(1H,d,J=8.7Hz),7.36(1H,m),7.41(2H,t,J=7.5Hz),7.64(2H,d,J=7.5Hz),7.73  $\delta$  7.77(  $\text{z}=\text{z}$ ; 3H,  $\text{z}=\text{z}$  d,J=8.4Hz),7.95(1H,s),8.20(1H,s),10.38(1H,s).

IR( $\text{CHCl}_3$ ):3450,3389,3003,2992,2925,2870,1708,1653,1598,1523,1495/cm.

$[\alpha]_D=-63.3^\circ$  (MeOH, $c=1.00,25^\circ\text{C}$ ).

No.2a-48

$[\alpha]_D=-63.8^\circ$  (MeOH, $c=1.00,24^\circ\text{C}$ ).

No.2a-49

$\text{CDCl}_3$  800MHz

1.00(1H,d,J=10.5Hz),1.17  $\delta$  1.26(  $\text{z}=\text{z}$ ; 3H,  $\text{z}=\text{z}$  s),1.55-2.52(14H,m),4.34(1H,m),5.35-5.54(2H,m),6.35(1H,d,J=9.0Hz),7.50-7.62(3H,m),7.90  $\delta$  8.83(  $\text{z}=\text{z}$ ; 2H,  $\text{z}=\text{z}$  d,J=8.4Hz),8.21(2H,m).

IR( $\text{CHCl}_3$ ):3451,3029,2922,2018,2925,2870,1708,1653,1542,1508,1498,1471,

1459 /cm.

$[\alpha]_D=-63.5^\circ$  (MeOH, $c=1.02,25^\circ\text{C}$ ).

m.p.185.0-187.0°C

No.2a-50

$[\alpha]_D=-63.9^\circ$  (MeOH, $c=1.01,24^\circ\text{C}$ ).

No.2a-51

d<sub>6</sub>-DMSO 300MHz

0.87(1H,d,J=9.0Hz),1.10  $\delta$  1.17(  $\text{z}=\text{z}$ ; 3H,  $\text{z}=\text{z}$  s),1.40-1.60(3H,m),1.90-2.40(11H,m),2.98(1H,m),5.35-5.46(2H,m),7.04(1H,s),7.65  $\delta$  7.91(  $\text{z}=\text{z}$ ; 2H,  $\text{z}=\text{z}$  d,J=8.7Hz),8.06(1H,d,J=6.0Hz),9.32(1H,brs).

IR(KBr):3385,2962,1734,1707,1682,1529,1498 /cm.

$[\alpha]_D=-63.4^\circ$  (MeOH, $c=1.01,24^\circ\text{C}$ ).

No.2a-52

$[\alpha]_D=-76.2^\circ$  (MeOH, $c=1.01,24^\circ\text{C}$ ).

No.2a-53

$[\alpha]_D=-73.9^\circ$  (MeOH, $c=1.02,24^\circ\text{C}$ ).

No.2a-54

$[\alpha]_D=-63.1^\circ$  (MeOH, $c=1.00,24^\circ\text{C}$ ).

No.2a-55

$[\alpha]_D=-67.8^\circ$  (MeOH, $c=1.00,24^\circ\text{C}$ ).

No.2a-56

$[\alpha]_D = +85.4^\circ$  (MeOH, c=1.02, 25°C).

No.2a-57

$[\alpha]_D = +68.4^\circ$  (MeOH, c=1.01, 24°C).

No.2a-58

$[\alpha]_D = +66.6^\circ$  (MeOH, c=1.01, 24°C).

No.2a-59

$[\alpha]_D = +65.5^\circ$  (MeOH, c=1.00, 24°C).

No.2a-60

$[\alpha]_D = +60.9^\circ$  (MeOH, c=1.02, 25°C).

No.2a-61

CDCl<sub>3</sub>, 300MHz

0.97(1H, d, J=10.0Hz), 1.10 1.22(2H, 2<sup>1</sup>2<sup>1</sup> s), 1.50-2.50(14H, m), 4.2  
6(1H, m), 5.80-5.84(2H, m), 6.28(1H, d, J=8.6Hz), 6.60 6.82(2<sup>1</sup>2<sup>1</sup> 1H, 2<sup>1</sup>2<sup>1</sup>  
d, J=12.4Hz), 7.12(2H, d, J=8.0Hz), 7.26 7.82(2<sup>1</sup>2<sup>1</sup> 2H, 2<sup>1</sup>2<sup>1</sup> d, J=8.6Hz  
, 8.47(2H, d, J=6.0Hz).

IR(CHCl<sub>3</sub>): 3452, 3027, 3019, 3018, 2926, 2870, 2480, 1708, 1681, 1608, 1520, 1494  
/cm.

$[\alpha]_D = +81.6^\circ$  (MeOH, c=1.01, 25°C).

No.2a-62

$[\alpha]_D = +72.0^\circ$  (MeOH, c=0.93, 25°C).

No.2a-63

CDCl<sub>3</sub>, 300MHz

0.89(1H, d, J=10.2Hz), 1.14 1.24(2<sup>1</sup>2<sup>1</sup> 2H, 2<sup>1</sup>2<sup>1</sup> s), 1.50-2.50(14H, m), 4.2  
9(1H, m), 5.86-5.88(2H, m), 6.25(1H, d, J=9.1Hz), 7.04 7.27(2<sup>1</sup>2<sup>1</sup> 1H, 2<sup>1</sup>2<sup>1</sup>  
d, J=16.5Hz), 7.37(2H, d, J=6.6Hz), 7.56 7.76(2<sup>1</sup>2<sup>1</sup> 2H, 2<sup>1</sup>2<sup>1</sup> d, J=8.4Hz),  
8.57(2H, d, J=6.6Hz).

IR(CHCl<sub>3</sub>): 3452, 3024, 3018, 3014, 2936, 2870, 2470, 1958, 1708, 1652, 1605, 1521,  
1496 /cm.

$[\alpha]_D = +69.2^\circ$  (MeOH, c=1.01, 25°C).

No.2a-64

$[\alpha]_D = +58.9^\circ$  (MeOH, c=1.24, 25°C).

No.2a-65

CDCl<sub>3</sub>, 300MHz

0.98(1H, d, J=10.5Hz), 1.12 1.23(2<sup>1</sup>2<sup>1</sup> 2H, 2<sup>1</sup>2<sup>1</sup> s), 1.54-2.46(14H, m), 4.2  
7(1H, m), 5.23(2H, s), 5.84-5.88(2H, m), 6.26(1H, d, J=8.4Hz), 7.82-7.45(5H, m), 7.  
64 7.71(2<sup>1</sup>2<sup>1</sup> 2H, 2<sup>1</sup>2<sup>1</sup> d, J=8.4Hz), 8.15(1H, s).

IR(CHCl<sub>3</sub>): 3452, 3088, 3065, 3032, 3018, 2935, 2870, 1708, 1653, 1611, 1559, 1522,  
1496 /cm.

$[\alpha]_D = +61.0^\circ$  (MeOH, c=0.91, 25°C).

No.2a-66

$[\alpha]_D = +78.0^\circ$  (MeOH, c=1.01, 25°C).

No.2a-67

CDCl<sub>3</sub>, 300MHz

0.98(1H, d, J=10.4Hz), 1.14 1.24(2<sup>1</sup>2<sup>1</sup> 3H, 2<sup>1</sup>2<sup>1</sup> s), 1.54-2.46(14H, m), 4.2  
8(1H, m), 5.23-5.53(2H, m), 6.27(1H, d, J=8.6Hz), 6.92-7.51(2<sup>1</sup>2<sup>1</sup> 1H, 2<sup>1</sup>2<sup>1</sup> d, J=16.4Hz),  
7.02(1H, dd, J=8.8 8.6Hz), 7.12(1H, d, J=8.6Hz), 7.34(1H, d, J=8.8  
Hz), 7.51 7.70(2<sup>1</sup>2<sup>1</sup> 2H, 2<sup>1</sup>2<sup>1</sup> d, J=8.4Hz).

IR(CHCl<sub>3</sub>):3453,3029,2918,2925,2870,1789,1650,1604,1524,1515,1494 /cm.  
[α]<sub>D</sub>=+76.2° (MeOH,c=1.00,25°C).  
m.p.104.0-106.0°C

No.2a-68  
[α]<sub>D</sub>=+57.7° (MeOH,c=1.01,25°C).

No.2a-6  
CDCl<sub>3</sub> 300MHz  
0.99(1H,d,J=10.2Hz),1.14 δ 1.24( z|z 3H, z|z 3) ,1.54-2.48(14H,m),4.2  
8(1H,m),6.34-5.53(3H,m),6.29(1H,d,J=9.0Hz),6.54-6.74( z|z 1H, z|z d,J=12.0Hz),7.02(1H,dd,J=4.8 δ 3.3Hz),6.97(1H,dd,J=8.3 δ 1.2Hz),7.18(1H,dd,J=4.8 δ 1.2Hz),7.44 δ 7.70( z|z 2H, z|z d,J=8.7Hz).  
IR(CHCl<sub>3</sub>):3453,3025,2910,2925,2870,1789,1650,1607,1589,1523,1493 /cm.  
[α]<sub>D</sub>=+58.4° (MeOH,c=1.00,25°C).

No.2a-70  
[α]<sub>D</sub>=+48.6° (MeOH,c=1.00,25°C).

No.2a-71  
CDCl<sub>3</sub> 300MHz  
0.98(1H,d,J=10.2Hz),1.12 δ 1.23( z|z 3H, z|z 3) ,1.53-2.46(14H,m),2.3  
1(3H,s),4.26(1H,m),5.38-5.52(3H,m),6.20(1H,d,J=9.0Hz),7.02-7.11(6H,m),7.  
70(2H,d,J=9.0Hz).  
IR(CHCl<sub>3</sub>):3460,3031,3023,3011,2925,2870,1789,1708,1650,1608,1597,1523,  
1490 /cm.  
[α]<sub>D</sub>=+48.9° (MeOH,c=1.01,25°C).

No.2a-72  
[α]<sub>D</sub>=+51.2° (MeOH,c=1.02,25°C).

No.2a-73  
CDCl<sub>3</sub> 300MHz  
0.97(1H,d,J=9.0Hz),1.11 δ 1.23( z|z 3H, z|z 3) ,1.54-2.48(14H,m),4.27(1H,m),5.82-5.52(3H,m),6.24(1H,d,J=9.0Hz),6.88-6.94(6H,m),7.65(2H,d,J=9.0Hz).  
IR(CHCl<sub>3</sub>):3598,3461,3199,3052,3012,2925,2870,1708,1842,1604,1524,1507,  
1491 /cm.  
[α]<sub>D</sub>=+52.2° (MeOH,c=1.01,25°C).

No.2a-74  
[α]<sub>D</sub>=+51.5° (MeOH,c=0.92,25°C).

No.2a-75  
CDCl<sub>3</sub> 300MHz  
0.97(1H,d,J=10.2Hz),1.11 δ 1.23( z|z 3H, z|z 3) ,1.55-2.48(14H,m),3.8  
2(8H,s),4.35(1H,m),5.82-5.52(2H,m),6.19(1H,d,J=9.7Hz),6.89-7.01(6H,m),7.  
65-7.58(2H,m).  
IR(CHCl<sub>3</sub>):3450,3025,3008,2925,2870,2827,1741,1849,1612,1521,1508,1490  
/cm.  
[α]<sub>D</sub>=+51.1° (MeOH,c=1.00,25°C).

No.2a-76  
[α]<sub>D</sub>=+60.4° (MeOH,c=0.98,25°C).

No.2a-77  
CDCl<sub>3</sub> 300MHz  
0.99(1H,d,J=10.5Hz),1.15 δ 1.24( z|z 3H, z|z 3) ,1.54-2.48(14H,m),2.3

4(3H,s),4.39(1H,m),5.33-5.54(2H,m),6.33(1H,d,J=8.4Hz),7.19 ~ 7.60 (각각 2H, 쌍쌍 d,J=8.4Hz),7.68 ~ 7.79(각각 2H, 각각 d,J=8.4Hz).  
IR(CHCl<sub>3</sub>):3452,3037,3012,2925,2870,1761,1709,1681,1611,1560,1527,1509,  
1459 /cm.  
[α]<sub>D</sub>=+61.1° (MeOH,c=1.01,25°C).

No.2a-78  
[α]<sub>D</sub>=+67.4° (MeOH,c=1.01,25°C).

No.2a-79  
CDCl<sub>3</sub>, 300MHz  
0.99(1H,d,J=10.8Hz),1.15 ~ 1.24( 쌍쌍 3H, 쌍쌍 s),1.54-2.54(14H,m),4.3 1(1H,m),5.32-5.54(2H,m),6.36(1H,d,J=8.2Hz),6.38 ~ 7.43( 각각 2H, 쌍쌍 d,J=8.6Hz),7.59 ~ 7.75( 쌍쌍 2H, 각각 d,J=8.4Hz).  
IR(CHCl<sub>3</sub>):3598,3448,3192,3030,3010,2925,2870,1708,1644,1608,1591,1559,  
1530,1518,1491 /cm.  
[α]<sub>D</sub>=+65.8° (MeOH,c=1.01,25°C).

No.2a-80  
[α]<sub>D</sub>=+66.9° (MeOH,c=1.01,25°C).

No.2a-81  
CDCl<sub>3</sub>, 300MHz  
0.99(1H,d,J=10.6Hz),1.15 ~ 1.24( 각각 3H, 쌍쌍 s),1.54-2.48(14H,m),3.8 6(3H,s),4.29(1H,m),5.34-5.52(2H,m),6.30(1H,d,J=8.7Hz),6.39 ~ 7.55 (각각 2H, 쌍쌍 d,J=9.0Hz),7.61 ~ 7.77( 각각 2H, 각각 d,J=8.7Hz).  
IR(CHCl<sub>3</sub>):3460,3009,2925,2870,2838,1740,1708,1650,1608,1557,1528,1512,  
1491 /cm.  
[α]<sub>D</sub>=+66.2° (MeOH,c=1.01,25°C).

No.2a-82  
[α]<sub>D</sub>=+67.7° (MeOH,c=1.01,24°C).

No.2a-83  
CDCl<sub>3</sub>, 300MHz  
0.97(1H,d,J=10.2Hz),1.12 ~ 1.23( 각각 3H, 쌍쌍 s),1.54-2.48(14H,m),3.8 3(3H,s),4.28(1H,m),5.32-5.52(2H,m),6.36(1H,d,J=8.7Hz),7.16 ~ 7.75 (각각 2H, 쌍쌍 d,J=8.7Hz).  
IR(CHCl<sub>3</sub>):3462,3030,3022,3012,2925,2870,1754,1709,1654,1604,1585,1522,  
1498 /cm.  
[α]<sub>D</sub>=+57.4° (MeOH,c=1.01,24°C).

No.2a-84  
[α]<sub>D</sub>=+57.8° (MeOH,c=1.01,24°C).

No.2a-85  
CDCl<sub>3</sub>, 300MHz  
0.95(1H,d,J=10.8Hz),1.12 ~ 1.23( 각각 3H, 각각 s),1.54-2.48(14H,m),4.2 5(1H,m),5.33-5.52(2H,m),6.28(1H,d,J=8.7Hz),6.37 ~ 7.57( 쌍쌍 2H, 쌍쌍 d,J=9.0Hz).  
IR(CHCl<sub>3</sub>):3590,3450,3168,3019,2925,2871,1708,1687,1608,1688,1581,  
1498 /cm.  
[α]<sub>D</sub>=+56.0° (MeOH,c=1.01,24°C).

No.2a-86  
[α]<sub>D</sub>=+59.8° (MeOH,c=1.01,23°C).

No.2a-87

**CDCl<sub>3</sub>, 800MHz**

0.99(1H,d,J=10.0Hz),1.18 δ 1.28( 2H, 2H, 2H, s),1.54-2.46(14H,m),3.8  
5(3H,s),4.25(1H,m),5.82-5.88(2H,m),6.19(1H,d,J=8.6Hz),6.93 δ 7.69 ( 2H,  
2H, 2H, d,J=9.0Hz).  
IR(CHCl<sub>3</sub>):3450,3080,3017,2925,2870,2840,1740,1708,1547,1508,1575,  
1525,1498 /cm.  
[α]<sub>D</sub>=+58.2° (MeOH,c=0.99,22°C).

No.2a-88

[α]<sub>D</sub>=+50.9° (MeOH,c=1.02,25°C).

No.2a-89

**CDCl<sub>3</sub>, 800MHz**

0.99(1H,d,J=10.2Hz),1.18 δ 1.26( 2H, 2H, 2H, s),1.56-2.45(14H,m),4.2  
9(1H,m),5.86-5.84(2H,m),7.02(1H,d,J=8.7Hz),7.21(1H,s),7.43(2H,m),7.74(1  
H,ddd,J=1.8,6.9 δ 8.7Hz),8.22(1H,dd,J=1.8 δ 8.1Hz).  
IR(CHCl<sub>3</sub>):3448,3087,3028,3014,2925,2870,1708,1685,1658,1630,1517,1468  
/cm.  
[α]<sub>D</sub>=+57.1° (MeOH,c=1.01,22°C).

m.p.117.0-118.0°C

No.2a-90

[α]<sub>D</sub>=+54.1° (MeOH,c=1.01,22°C).

No.2a-91

**CDCl<sub>3</sub>, 800MHz**

0.97(1H,d,J=10.2Hz),1.18 δ 1.28( 2H, 2H, 2H, s),1.52-2.46(14H,m),4.2  
4(1H,m),5.84-5.82(2H,m),5.49-6.88(2H,m),7.11(1H,dd,J=0.9 and 2.6Hz),7.4  
4(1H,dd,J=0.9 δ 1.8Hz).

IR(CHCl<sub>3</sub>):3487,3038,3023,3014,2925,2870,1789,1708,1655,1595,1520,1473 /cm.

/cm.

[α]<sub>D</sub>=+55.0° (MeOH, c=1.00, 23°C).

No.2a-92

[α]<sub>D</sub>=+50.5° (MeOH, c=1.00, 23°C).

No.2a-93

CDCl<sub>3</sub> 800MHz

0.95(1H,d,J=10.5Hz),1.13 δ 1.23(2/2' 3H,2/2' s),1.52-2.46(14H,m),4.2  
5(1H,m),5.84-5.92(2H,m),6.12(1H,d,J=8.7Hz),7.07(1H,dd,J=3.9 δ 5.1Hz),  
7.48-7.48(2H,m).

IR(CHCl<sub>3</sub>):3450,3023,3011,2925,2870,1789,1708,1645,1531,1501,1471 /cm.

[α]<sub>D</sub>=+49.1° (MeOH, c=1.02, 24°C).

No.2a-94

[α]<sub>D</sub>=+51.5° (MeOH, c=1.00, 24°C).

No.2a-95

CDCl<sub>3</sub> 800MHz

0.96(1H,d,J=10.5Hz),1.11 δ 1.23(2/2' 3H,2/2' s),1.52-2.46(14H,m),4.2  
5(1H,m),5.84-5.96(2H,m),6.14(1H,d,J=8.7Hz),7.34(1H,d,J=2.0Hz),7.68(1H,t,  
J=2.0Hz).

IR(CHCl<sub>3</sub>):3452,3114,3080,3018 2925,2870,1708,1649,1535,1498,1471/cm.

[α]<sub>D</sub>=+55.8° (MeOH, c=1.00, 23°C).

m.p.87.0-88.0°C

No.2a-96

CD<sub>3</sub>OD 800MHz

0.94(1H,d,J=10.3Hz),1.13  $\delta$  1.22( $\text{z}=\text{z}$ , $\text{H},\text{z}=\text{z}$ ),1.50-1.78(5H,m),1.94-2.39(11H,m),4.11(1H,m),5.39-5.49(2H,m),7.43-7.51(2H,m),8.06(1H,m).  
IR(KBr):3369,3084,2955,2921,2868,1690,1666,1588,1503 /cm.  
[ $\alpha$ ]<sub>D</sub>=+88.8° (MeOH,c=1.01,23°C).

No.2a-97

CD<sub>3</sub>OD 300MHz

0.92(1H,d,J=0.9Hz),1.13  $\delta$  1.22( $\text{z}=\text{z}$ , $\text{H},\text{z}=\text{z}$ ),1.48-1.58(3H,m),1.98-2.36(11H,m),4.10(1H,m),5.35-5.50(2H,m),7.42-7.51(2H,m),8.06(1H,m).  
IR(KBr):3447,3087,2987,2922,2868,1629,1545,1501 /cm.  
[ $\alpha$ ]<sub>D</sub>=+52.9° (MeOH,c=1.01,24°C).

No.2a-98

[ $\alpha$ ]<sub>D</sub>=+53.2° (MeOH,c=1.02,23°C).

No.2a-99

CDCl<sub>3</sub> 300MHz

0.97(1H,d,J=10.2Hz),1.12  $\delta$  1.22( $\text{z}=\text{z}$ , $\text{H},\text{z}=\text{z}$ ),1.26-2.45(24H,m),4.25(2H,m),5.34-5.52(2H,m),6.18(1H,d,J=8.7Hz),6.91  $\delta$  7.66( $\text{z}=\text{z}$ ,2H, $\text{z}=\text{z}$ ,d,J=9.0Hz).  
IR(CHCl<sub>3</sub>):3455,3029,3019,2939,2862,1738,1709,1645,1605,1523,1494 /cm.  
[ $\alpha$ ]<sub>D</sub>=+51.4° (MeOH,c=1.00,23°C).

No.2a-100

[ $\alpha$ ]<sub>D</sub>=+49.3° (MeOH,c=1.00,24°C).

No.2a-101

[ $\alpha$ ]<sub>D</sub>=+51.3° (MeOH,c=1.00,24°C).

No.2a-102

[ $\alpha$ ]<sub>D</sub>=+48.8° (MeOH,c=1.01,23°C).

No.2a-103

CDCl<sub>3</sub> 300MHz

0.94(1H,d,J=10.3Hz),1.13  $\delta$  1.23( $\text{z}=\text{z}$ , $\text{H},\text{z}=\text{z}$ ),1.52-2.46(14H,m),2.48(3H,d,J=0.3Hz),4.20(1H,m),5.32-5.54(2H,m),6.48(1H,brs),7.12(1H,d,J=9.0Hz).  
IR(CHCl<sub>3</sub>):3415,3144,3029,3011,2926,2871,1708,1671,1595,1538,14564 /cm

[ $\alpha$ ]<sub>D</sub>=+49.6° (MeOH,c=1.01,23°C).

No.2a-104

[ $\alpha$ ]<sub>D</sub>=+77.0° (MeOH,c=1.02,23°C).

No.2a-105

CDCl<sub>3</sub> 300MHz

0.99(1H,d,J=9.9Hz),1.09  $\delta$  1.21( $\text{z}=\text{z}$ , $\text{H},\text{z}=\text{z}$ ),1.51-2.44(14H,m),2.90(8H,s),4.20(1H,m),5.38-5.50(2H,m),5.87(1H,d,J=9.0Hz),6.25  $\delta$  7.54( $\text{z}=\text{z}$ ,1H, $\text{z}=\text{z}$ ,d,J=15.6Hz),6.84(1H,d,J=8.1Hz),7.08(1H,d,J=1.8Hz),7.09(1H,dd,J=1.8,  $\delta$  8.1Hz).  
IR(CHCl<sub>3</sub>):3439,3028,3013,2927,2871,2841,1739,1708,1661,1630,1600,1518 /cm.  
[ $\alpha$ ]<sub>D</sub>=+77.3° (MeOH,c=1.01,23°C).

No.2a-106

[ $\alpha$ ]<sub>D</sub>=+67.0° (MeOH,c=1.00,25°C).

No.2a-107

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$[\alpha]_D = +68.8^\circ$  (MeOH,  $c=1.01, 24^\circ\text{C}$ ).  
m.p. 168.0–170.0°C.

[ $\alpha$ ]<sub>D</sub><sup>25</sup> = +61.8° (Me H, c=1.00, 23°C).

No.3a-109  
 $\text{CDCl}_3$  300MHz  
 0.96 (1H,d,J=10.2Hz), 1.10  
 5 (1H,m), 5.88-5.49 (2H,m), 6.31 (1H,  
 d,J=8.7Hz), 7.83-7.41 (5H,s).  
 IR ( $\text{CHCl}_3$ ): 3453, 3062, 2928, 2814, 23  
 1481 /cm.  
 $[\alpha]_D = +61.0^\circ$  ( $\text{MeOH}, c=1.01, 22^\circ\text{C}$ ).

No.2a-110  
 $\text{CD}_3\text{OD}$  300MHz  
 $0.94(1\text{H},\text{d},J=9.9\text{Hz}), 1.13$   $\mu$  1.22  
 $1\text{H},\text{m}), 5.38-5.49(2\text{H},\text{m}), 7.25$   $\mu$   
 $\text{IR}(\text{KBr}): 3485, 3058, 2986, 2920, 2866$   
 $\text{cm}^{-1}$ .  
 $[\alpha]_D = +47.8^\circ$  ( $\text{MeOH}, c=1.01, 23^\circ\text{C}$ ).

[ $\alpha$ ]<sub>D</sub><sup>25</sup> = +85.6° (MeOH, c = 1.01, 24°C).

No.3a-112  
 $\text{CDCl}_3$ , 300MHz  
 0.97(1H,d,J=10.0Hz), 1.12 (d,J=9.0Hz), 5.85-5.50(2H,m), 6.22(1H,s), 7(1H,m); IR(CHCl<sub>3</sub>): 3489, 3028, 3012, 2987, 2865 /cm.  
 $[\alpha]_D = +65.6^\circ$  (MeOH, c=1.01, 23°C).

[ $\alpha$ ]<sub>D</sub><sup>20</sup> = +59.6° (MeOH, c=1.00, 24°C).

No.2a-114  
 $\text{CDCl}_3$ , 300MHz  
 0.98(1H,d,J=10.2Hz), 1.12  $\mu$  1.29(1H,m), 5.85-5.81(2H,m), 6.28(1H,d,J=8.4Hz).  
 IR(CHCl<sub>3</sub>):3439,3028,3012,2937,2857/cm.  
 $[\alpha]_D^{25}=+60.6^\circ$  (MeOH,c=1.01,22°C).

No.2a-115

No.2a-116  
 $\text{CDCl}_3$ , 300MHz:  
 0.97(1H,d,J=10.2Hz),1.13    s 1.25  
 9(3H,s),4.27(1H,m),5.88-5.51(2H,m)  
 (2x2 2H, s,s) d,J=8.4Hz).  
 IR(CHCl<sub>3</sub>):3459,3028,3012,2937,2856

$[\alpha]_D = +59.7^\circ$  (MeOH, c=0.99, 24°C).

No.2a-117

$[\alpha]_D = +56.7^\circ$  (MeOH, c=1.0, 22°C).

No.2a-118

CDCl<sub>3</sub> 300MHz

0.96(1H,d,J=10.2Hz),1.11 δ 1.23(x<sub>2</sub>x<sub>2</sub> 3H, x<sub>2</sub>x<sub>2</sub> s),1.53-2.44(14H,m),4.2  
δ(1H,m),5.34-5.51(2H,m),6.02(2H,s),6.19(1H,d,J=8.7Hz),6.89(1H,dd,J=1.2  
δ 7.5Hz),7.22-7.35(2H,m).

IR(CHCl<sub>3</sub>):3468,3031,3020,3024,2970,1740,1708,1650,1619,1605,1519,  
1504,1480 /cm.

$[\alpha]_D = +57.2^\circ$  (MeOH, c=1.02, 23°C).

No.2a-119

CDCl<sub>3</sub> 300MHz

0.96(1H,d,J=10.5Hz),1.07 δ 1.23(x<sub>2</sub>x<sub>2</sub> 3H, x<sub>2</sub>x<sub>2</sub> s),1.51-2.44(14H,m),2.8  
δ(3H,s),4.26(1H,m),5.37-5.52(2H,m),6.40(1H,d,J=9.0Hz),7.09(1H,m),7.30(1  
H,m),7.46(1H,m),7.66(1H,m).

IR(CHCl<sub>3</sub>):3448,3028,3012,2928,2970,1768,1747,1709,1657,1607,1516,1479  
/cm.

$[\alpha]_D = +58.2^\circ$  (MeOH, c=0.99, 21°C).

No.2a-120

CDCl<sub>3</sub> 300MHz

0.98(1H,d,J=10.2Hz),1.14 δ 1.24(x<sub>2</sub>x<sub>2</sub> 3H, x<sub>2</sub>x<sub>2</sub> s),1.53-2.44(14H,m),4.0  
δ(1H,m),5.35-5.52(2H,m),6.42(1H,d,J=8.7Hz),6.88(1H,m),6.99(1H,dd,J=1.2  
δ 8.4Hz),7.27(1H,m),7.89(1H,m).

IR(CHCl<sub>3</sub>):3468,3033,3031,3014,3002,2924,2970,1708,1648,1597,1523,1488  
/cm.

$[\alpha]_D = +48.8^\circ$  (MeOH, c=1.01, 21°C).

No.2a-121

CDCl<sub>3</sub> 300MHz

0.98(1H,d,J=10.2Hz),1.14 δ 1.26(x<sub>2</sub>x<sub>2</sub> 3H, x<sub>2</sub>x<sub>2</sub> s),1.47-2.47(14H,m),3.9  
δ(3H,s),4.81(1H,m),5.33-5.60(2H,m),6.98(1H,dd,J=0.9 δ 8.4Hz),7.09(1H,  
ddd,J=0.9,7.7 δ 8.4Hz),7.46(1H,m),8.19(1H,dd,J=2.1 δ 8.1Hz),8.33(1  
H,d,J=9.0Hz).

IR(CHCl<sub>3</sub>):3400,3078,3028,3020,3007,2924,2970,2842,1786,1708,1640,1600,  
1586,1488,1470 /cm.

$[\alpha]_D = +38.1^\circ$  (MeOH, c=1.02, 23°C).

No.2a-122

$[\alpha]_D = +42.8^\circ$  (MeOH, c=0.99, 23°C).

No.2a-123

$[\alpha]_D = +38.7^\circ$  (MeOH, c=1.00, 21°C).

No.2a-124

$[\alpha]_D = +45.0^\circ$  (MeOH, c=1.01, 21°C).

m.p.119.0-120.0°C

No.2a-125

$[\alpha]_D = +49.8^\circ$  (MeOH, c=1.01, 23°C).

No.2a-126

CDCl<sub>3</sub> 300MHz

0.97(1H,d,J=10.2Hz),1.11 δ 1.25(x<sub>2</sub>x<sub>2</sub> 3H, x<sub>2</sub>x<sub>2</sub> s),1.53-2.47(14H,m),4.2

8(1H,m),5.34-5.50(2H,m),6.82(1H,d,J=8.7Hz),7.65-7.81(4H,m).  
IR(CHCl<sub>3</sub>):3400,3078,3028,3020,3007,2934,2870,2843,1786,1708,1640,1600,  
1538,1488,1470 /cm.  
[α]<sub>D</sub>=+68.0° (MeOH,c=1.01,23°C).

5

No.2a-127  
CDCl<sub>3</sub> 800MHz  
0.91(1H,d,J=10.2Hz),1.10 δ 1.20( 2H, 2<sup>t</sup>2<sup>t</sup> s),1.50-2.42(14H,m),4.2  
8(1H,m),5.31-5.51(2H,m),6.45(1H,d,J=8.4Hz),7.01(1H,t,J=7.4Hz),7.23-7.27(  
10 2H,m),7.38-7.40(4H,m),7.53(2H,d,J=9.0Hz),8.20 δ 8.48( 2<sup>t</sup>2<sup>t</sup> 1H, 2<sup>t</sup>2<sup>t</sup> s)  
IR(CHCl<sub>3</sub>):3452,3028,3022,3015,2925,2870,1708,1654,1590,1514,1478 /cm.  
[α]<sub>D</sub>=+59.5° (MeOH,c=1.01,23°C).

15 No.2a-128

d<sub>4</sub>-DMSO 800MHz  
0.84(1H,d,J=8.9Hz),1.06 δ 1.19( 2H, 2<sup>t</sup>2<sup>t</sup> s),1.37-2.37(14H,m),8.79(  
1H,m),5.35-5.51(3H,m),6.05(1H,d,J=8.7Hz),6.85-8.90(1H,m),7.18-7.28(2H,m)  
,7.35-7.38(2H,m),8.42(1H,s),12.00(1H,s).  
IR(ν<sub>cm</sub>):3395,3345,2925,2866,2628,2508,1697,1658,1638,1597,1557 /cm.  
[α]<sub>D</sub>=+26.0° (MeOH,c=1.01,23°C).  
m.p.164.0-166.0°C

No.2a-129

26 CDCl<sub>3</sub> 800MHz  
1.01(1H,d,J=10.0Hz),1.17 δ 1.25( 2<sup>t</sup>2<sup>t</sup> 2H, 2<sup>t</sup>2<sup>t</sup> s),1.54-2.52(14H,m),4.2  
4(1H,m),5.36-5.57(2H,m),6.42(1H,d,J=8.6Hz),7.51-7.60(2H,m),7.77(1H,dd,J  
=1.8 δ 8.6Hz),7.85-7.98(3H,m),8.34(1H,bre).  
IR(CHCl<sub>3</sub>):3451,3060,3028,3010,2925,2870,1708,1652,1629,1600,1517,1502

/cm.

[α]<sub>D</sub>=+68.6° (MeOH,c=1.00,23°C).

No.2a-130

CDCl<sub>3</sub> 800MHz  
1.02(1H,d,J=10.2Hz),1.04 δ 1.26( 2<sup>t</sup>2<sup>t</sup> 2H, 2<sup>t</sup>2<sup>t</sup> s),1.54-2.52(14H,m),4.4  
1(1H,m),5.41-5.58(2H,m),6.14(1H,d,J=8.0Hz),7.48-7.59(4H,m),7.85-7.92(3H,  
m),8.27(1H,dd,J=1.8 δ 7.2Hz).  
IR(CHCl<sub>3</sub>):3435,3032,3010,2924,2870,2864,1708,1652,1512,1498 /cm.  
[α]<sub>D</sub>=+98.9° (MeOH,c=1.00,23°C)  
m.p.94.0-96.0°C

No.2a-131

[α]<sub>D</sub>=+50.3° (MeOH,c=0.95,21°C).

No.2a-132

[α]<sub>D</sub>=+10.9° (MeOH,c=0.92,21°C).

No.2a-133

[α]<sub>D</sub>=+60.4° (MeOH,c=1.00,21°C).

No.2a-134

[α]<sub>D</sub>=+88.5° (MeOH,c=1.01,23°C).

No.2a-135

[α]<sub>D</sub>=+52.5° (MeOH,c=1.01,23°C).

m.p.180.0-182.0°C

No.2a-136

$[\alpha]_D = +88.8^\circ$  (MeOH, c=1.02, 22°C),  
m.p. 79.0–80.0°C

No.2a-137

CDCl<sub>3</sub>, 300MHz  
0.97(1H,d,J=10.2Hz),1.11 δ 1.23(2Jz; 2H, zJz; e),1.43(2H,t,J=6.9Hz),1.  
52-2.44(14H,m),4.08(1H,d,J=6.0Hz),4.38(1H,m),5.88-5.90(2H,m),6.19(1H,d,  
J=8.7Hz),6.88-7.00(6H,m),7.65-7.68(2H,m).  
IR(CHCl<sub>3</sub>):3455,3031,3024,2914,2928,2925,2870,1741,1708,1649,1602,1521,  
1504,1490 /cm.  
 $[\alpha]_D = +52.0^\circ$  (MeOH, c=1.01, 22°C).

No.2a-138

CDCl<sub>3</sub>, 300MHz  
0.97(1H,d,J=10.2Hz),1.11 δ 1.23(2Jz; 2H, zJz; e),1.55(6H,d,J=6.0Hz),1.  
53-2.46(14H,m),4.28(1H,m),4.51(1H,m),5.88-5.90(2H,m),6.12(1H,d,J=6.0Hz)  
,6.87-6.99(6H,m),7.65-7.68(2H,m).  
IR(CHCl<sub>3</sub>):3454,3031,3014,2926,2925,2870,1741,1708,1649,1602,1522,1490  
/cm.  
 $[\alpha]_D = +50.0^\circ$  (MeOH, c=1.05, 22°C).

No.2a-139

CDCl<sub>3</sub>, 300MHz  
1.00(1H,d,J=10.2Hz),1.18 δ 1.24(2Jz; 2H, zJz; e),1.59-2.52(14H,m),4.5  
1(1H,m),5.40-5.53(2H,m),6.86(1H,d,J=6.7Hz),6.70(1H,d,J=1.5Hz),7.12(1H,  
m),7.80(1H,m),7.47(1H,dd,J=0.6 δ 8.1Hz),7.61(1H,d,J=8.4Hz).  
IR(CHCl<sub>3</sub>):3449,3243,3029,3022,3018,2925,2871,1707,1631,1549,1503 /cm.  
 $[\alpha]_D = +68.4^\circ$  (MeOH, c=1.00, 22°C).  
m.p. 178.0–179.0°C

No.2a-140

CDCl<sub>3</sub>, 300MHz  
0.97(1H,d,J=10.2Hz),1.18 δ 1.28(2Jz; 2H, zJz; e),1.57-2.50(14H,m),4.8  
5(1H,m),5.82-5.85(2H,m),6.43(1H,d,J=6.7Hz),6.70(1H,d,J=1.5Hz),7.21-7.34(  
2H,m),7.46(1H,m),7.76(1H,m),7.88(1H,d,J=8.0Hz),10.20(1H,s).  
IR(CHCl<sub>3</sub>):3465,3010,2924,1739,1604,1546,1504 /cm.  
 $[\alpha]_D = +39.4^\circ$  (MeOH, c=1.01, 22°C).  
m.p. 167.0–168.0°C

No.2a-141

CDCl<sub>3</sub>, 300MHz  
0.99(1H,d,J=10.2Hz),1.14 δ 1.24(2Jz; 2H, zJz; e),1.55-2.44(14H,m),3.5  
4(3H,s),4.27(1H,m),5.84-5.82(2H,m),6.28(1H,d,J=9.0Hz),6.91 δ 7.47  
(zJz 2H, zJz d,J=9.0Hz),6.98 δ 7.14(zJz 1H, zJz d,J=16.5Hz),7.54  
δ 7.70(zJz 2H, zJz d,J=8.7Hz).  
IR(CHCl<sub>3</sub>):3458,3026,3015,2925,2870,2889,1740,1708,1649,1602,1510,1492,  
1470 /cm.  
 $[\alpha]_D = +78.4^\circ$  (MeOH, c=1.02, 22°C).  
m.p. 155.0–157.0°C

No.2a-142

CDCl<sub>3</sub>, 300MHz  
0.97(1H,d,J=10.2Hz),1.11 δ 1.23(2Jz; 2H, zJz; e),1.52-2.45(14H,m),3.7  
9(3H,s),4.27(1H,m),5.84-5.80(2H,m),6.24(1H,d,J=9.0Hz),6.49 δ 6.62  
(zJz 1H, zJz d,J=12.8Hz),6.77 δ 7.16(zJz 2H, zJz d,J=8.7Hz),7.32  
δ 7.59(zJz 2H, zJz d,J=8.1Hz).  
IR(CHCl<sub>3</sub>):3453,3026,3014,2926,2870,2889,1759,1708,1649,1606,1510,  
1494 /cm.

$[\alpha]_D = +80.7^\circ$  (MeOH, c=0.99, 22°C).

No.2a-148

$[\alpha]_D = +57.8^\circ$  (MeOH, c=1.01, 22°C).

No.2a-144

$[\alpha]_D = +12.2^\circ$  (MeOH, c=1.00, 22°C).

m.p.114.0-116.0°C

No.2a-145

CDCl<sub>3</sub>, 300MHz

0.95(1H,d,J=10.5Hz),1.10  
 및 1.21(각각 2H, 각각 s),1.53-2.44(14H,m),4.2  
 5(1H,m),5.33-5.49(2H,m),6.37(1H,d,J=8.7Hz),7.45-7.47(3H,m),7.53-7.56(3H,  
 m),7.69  
 및 7.80(각각 2H, 각각 d,J=7.5Hz).  
 IR(CHCl<sub>3</sub>):3449,3058,2927,2925,2870,1708,1655,1518,1481,1048 /cm.

$[\alpha]_D = +61.0^\circ$  (MeOH, c=1.01, 22°C).

No.2a-146

CDCl<sub>3</sub>, 300MHz

0.95(1H,d,J=10.5Hz),1.09  
 및 1.21(각각 2H, 각각 s),1.53-2.41(14H,m),4.2  
 5(1H,m),5.33-5.49(2H,m),6.33(1H,d,J=8.4Hz),7.49-7.61(3H,m),7.91-7.93(2H,  
 m),7.82  
 및 7.97(각각 2H, 각각 d,J=8.7Hz).

IR(CHCl<sub>3</sub>):3447,3029,3023,3015,2925,2870,1708,1660,1614,1484,1321,1161  
 /cm.

$[\alpha]_D = +52.0^\circ$  (MeOH, c=1.00, 22°C).

No.2a-147

CDCl<sub>3</sub>, 300MHz

0.97(1H,d,J=10.5Hz),1.12  
 및 1.23(각각 2H, 각각 s),1.53-2.46(14H,m),2.5

1(3H,s),4.28(1H,m),5.34-5.51(2H,m),6.28(1H,d,J=8.4Hz),7.26  
 및 7.64  
(각각 2H, 각각 d,J=8.4Hz).

IR(CHCl<sub>3</sub>):3458,3027,3015,2925,2870,2885,1708,1645,1696,1518,1484 /cm.

$[\alpha]_D = +67.7^\circ$  (MeOH, c=0.82, 22°C).

No.2a-148

$[\alpha]_D = +72.5^\circ$  (MeOH, c=1.01, 22°C).

No.2a-149

$[\alpha]_D = +57.8^\circ$  (MeOH, c=0.98, 22°C).

No.2a-150

CDCl<sub>3</sub>, 300MHz

0.94(1H,d,J=10.5Hz),1.10  
 및 1.23(각각 2H, 각각 s),1.53-2.50(14H,m),4.2  
 2(1H,m),5.38-5.55(2H,m),6.48(1H,d,J=8.4Hz),8.35(1H,s),8.90(1H,s).

IR(CHCl<sub>3</sub>):3448,3374,3091,3024,3012,2925,2871,1709,1652,1525,1494 /cm.

$[\alpha]_D = +58.1^\circ$  (MeOH, c=1.01, 22°C).

m.p.120.0-122.0°C

No.2a-151

$[\alpha]_D = +40.6^\circ$  (MeOH, c=1.01, 22°C).

No.2a-152

CDCl<sub>3</sub>, 300MHz

0.96(1H,d,J=10.5Hz),1.10  
 및 1.24(각각 2H, 각각 s),1.50-2.50(14H,m),2.7  
 1(3H,s),4.28(1H,m),5.37-5.51(2H,m),6.02(1H,d,J=9.0Hz),8.78(1H,s).

IR(CHCl<sub>3</sub>):3468,3485,3087,3025,3014,2925,2870,1708,1649,1528,1503 /cm.

$[\alpha]_D = +54.1^\circ$  (MeOH, c=1.02, 22°C).

No.2a-153

CDCl<sub>3</sub>, 300MHz

0.95(1H,d,J=9.9Hz),1.11 δ 1.23(  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H),1.50-2.50(14H,m),2.50(3H,s),4.26(1H,m),5.88-5.91(2H,m),6.01(1H,d,J=8.4Hz),6.88(1H,d,J=5.1Hz),7.88(1H,d,J=5.1Hz).

IR(CHCl<sub>3</sub>):3469,3431,3025,2925,2871,2864,1708,1659,1544,1505 /cm.  
[α]<sub>D</sub>=+35.8° (MeOH,c=1.01,22°C).

No.2a-154

CDCl<sub>3</sub>, 300MHz

0.95(1H,d,J=9.9Hz),1.10 δ 1.22(  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H),1.52-2.46(14H,m),2.51(3H,d,J=1.2Hz),4.26(1H,m),5.84-5.90(2H,m),6.00(1H,d,J=8.4Hz),6.78(1H,dd,J=5.1 δ 3.8Hz),7.29(1H,d,J=8.6Hz).

IR(CHCl<sub>3</sub>):3450,3431,3026,3011,2925,2869,1789,1708,1639,1547,1508 /cm.  
[α]<sub>D</sub>=+50.5° (MeOH,c=1.01,22°C).

No.2a-155

CDCl<sub>3</sub>, 300MHz

0.99(1H,d,J=10.2Hz),1.19 δ 1.25(  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H),1.58-2.48(14H,m),4.81(1H,m),5.88-5.91(2H,m),6.79(1H,d,J=9.8Hz),7.29(1H,m),7.41(1H,m),7.46(1H,s),7.61(1H,m),7.66(1H,d,J=8.1Hz).

IR(CHCl<sub>3</sub>):3456,3029,3024,3015,2925,2871,2870,1708,1659,1598,1510 /cm.  
[α]<sub>D</sub>=-69.1° (MeOH,c=1.01,22°C).

No.2a-156

CDCl<sub>3</sub>:CD<sub>3</sub>O<sub>P</sub>=10:1 300MHz

0.99(1H,d,J=9.9Hz),1.11 δ 1.21(  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H),1.56-2.58(14H,m),4.22(1H,m),5.85-5.89(2H,m),6.85(1H,d,J=8.4Hz),7.48(1H,d,J=8.4Hz),7.61(1H,dd,J=1.8 δ 8.4Hz),8.09(1H,d,J=1.8Hz),8.12(1H,s).

IR(KBr):3432,3115,2985,2929,2869,2808,1708,1656,1578,1539,1470 /cm.  
[α]<sub>D</sub>=+62.8° (MeOH,c=1.01,22°C).

No.2a-157

5 [α]<sub>D</sub>=+40.0° (MeOH,c=0.95,22°C).

No.2a-158

CDCl<sub>3</sub>, 300MHz

1.00(1H,d,J=10.5Hz),1.17 δ 1.24(  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H),1.54-2.50(14H,m),4.8

10 4(1H,m),5.86-5.89(2H,m),7.80(1H,d,J=9.0Hz),8.30(1H,s).

IR(CHCl<sub>3</sub>):3410,3192,3080,3012,2926,2871,2868,1709,1687,1538,1466 /cm.  
[α]<sub>D</sub>=+44.9° (MeOH,c=0.99,22°C).

No.2a-159

15 CDCl<sub>3</sub>, 300MHz

0.97(1H,d,J=10.2Hz),1.18 δ 1.22(  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H),1.55-2.48(14H,m),8.0

3(6H,s),4.88(1H,m),5.82-5.85(2H,m),6.16(1H,d,J=8.7Hz),6.87 δ 7.68

(  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H, d,J=8.7Hz).

IR(CHCl<sub>3</sub>):3457,3028,2906,2924,2870,2854,1788,1708,1657,1608,1608,1584,

20 1601 /cm.

[α]<sub>D</sub>=+84.8° (MeOH,c=1.01,22°C).

No.2a-160

d<sub>4</sub>-DMSO 300MHz

25 0.93(1H,d,J=9.9Hz),1.02 δ 1.19(  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H,  $\chi_{\text{d}}$  2H),1.58-1.61(8H,m),1.90-2.

32(1H,m),3.90(1H,m),5.41-5.44(2H,m),7.83(1H,dd,J=0.9 δ 7.2Hz),7.45-

7.80(2H,m),7.77(1H,dd,J=0.9 δ 7.2Hz),8.08(1H,d,J=8.9Hz),12.40(1H,s).

IR(  $\nu_{\text{cm}}$  ):3315,2924,2856,2855,2585,1787,1708,1687,1598,1581,1541 /cm.

[α]<sub>D</sub>=+78.5° (MeOH,c=1.01,24°C).

m.p.161.0-162.0°C

No.2a-161

[ $\alpha$ ]<sub>D</sub>=+45.8° (MeOH, c=1.00, 22°C).

No.2a-162

CDCl<sub>3</sub> 800MHz

0.99(1H,d,J=10.3Hz),1.13 δ 1.25(2<sub>2</sub> 3H, 双峰 s),1.55-2.45(14H,m),4.3δ(1H,m),5.36-5.51(2H,m),6.82(1H,d,J=8.4Hz),7.88 δ 8.28(2<sub>2</sub> 2H, 双峰 d,J=9.0Hz).

IR(CHCl<sub>3</sub>):3448,3029,2928,2870,1708,1684,1602,1527,1484,1347 /cm.

[ $\alpha$ ]<sub>D</sub>=+72.7° (MeOH, c=1.02, 22°C).

No.2a-163

CDCl<sub>3</sub> 800MHz

0.96(1H,d,J=10.3Hz),1.11 δ 1.28(2<sub>2</sub> 3H, 双峰 s),1.55-2.61(14H,m),4.3δ(1H,m),5.36-5.57(2H,m),6.68(1H,d,J=7.8Hz),7.41(1H,dd,J=4.8 δ 8.1Hz),8.20(1H,d,J=8.1Hz),8.68(1H,d,J=4.8Hz),9.00(1H,s).

IR(CHCl<sub>3</sub>):3448,3028,2918,2928,2870,2884,1709,1658,1590,1515,1471 /cm.

[ $\alpha$ ]<sub>D</sub>=+71.8° (MeOH, c=1.01, 22°C).

No.2a-164

[ $\alpha$ ]<sub>D</sub>=+40.8° (MeOH, c=0.98, 22°C).

No.2a-165

CDCl<sub>3</sub> 800MHz

0.98(1H,d,J=10.5Hz),1.11 δ 1.24(2<sub>2</sub> 3H, 双峰 s),1.55-2.58(14H,m),4.3δ(1H,m),5.37-5.57(2H,m),6.68(1H,d,J=7.8Hz),7.59 δ 8.58(2<sub>2</sub> 2H δ 2<sub>2</sub> d,J=8.0Hz).

IR(CHCl<sub>3</sub>):3447,3346,3028,2918,2928,2870,2888,1941,1708,1662,1598,1516

/cm.

[ $\alpha$ ]<sub>D</sub>=+78.4° (MeOH, c=1.01, 22°C).

No.2a-166

CDCl<sub>3</sub> 800MHz

0.97(1H,d,J=10.3Hz),1.11 δ 1.22(2<sub>2</sub> 3H, 双峰 s),1.51-2.44(14H,m),2.9δ(6H,s),4.25(1H,m),5.33-5.50(2H,m),6.19(1H,d,J=8.7Hz),6.77 δ 6.97(2<sub>2</sub> 2H, 双峰 d,J=8.4Hz),6.94 δ 7.65(2<sub>2</sub> 2H, 双峰 d,J=9.0Hz).

IR(CHCl<sub>3</sub>):3458,3024,2916,2924,2871,2806,1789,1708,1647,1612,1504,1515,1490 /cm.

[ $\alpha$ ]<sub>D</sub>=+88.1° (MeOH, c=1.02, 22°C).

m.p.104.0-105.5°C

No.2a-167

CDCl<sub>3</sub> 800MHz

1.01(1H,d,J=9.9Hz),1.19 δ 1.26(2<sub>2</sub> 3H, 双峰 s),1.56-2.58(14H,m),4.3δ(1H,m),5.36-5.55(2H,m),6.47(1H,d,J=8.4Hz),7.61-7.71(2H,m),7.79(2H,s),7.69-7.97(2H,m),8.27(1H,d,J=2.1Hz),8.66-8.78(2H,m).

IR(CHCl<sub>3</sub>):3450,3024,2914,2925,2870,2887,1707,1650,1581,1509 /cm.

[ $\alpha$ ]<sub>D</sub>=+70.5° (MeOH, c=1.00, 22°C).

No.2a-168

CDCl<sub>3</sub> 800MHz

1.02(1H,d,J=10.3Hz),1.20 δ 1.26(2<sub>2</sub> 3H, 双峰 s),1.56-2.50(14H,m),4.3δ(1H,m),5.36-5.56(2H,m),6.61(1H,d,J=8.4Hz),7.61-7.93(7H,m),8.74(1H,d,J=8.4Hz),9.15(1H,s).

IR(CHCl<sub>3</sub>):3517,3451,3060,2928,2911,2925,2870,2884,1709,1651,1619,1498 /cm.

$[\alpha]_D = +54.4^\circ$  (MeOH, c=1.00, 23°C).

No.2a-169

CDCl<sub>3</sub>, 300MHz.

0.96(1H,d,J=10.2Hz),1.09 δ 1.21(交错 2H, 叠加 s),1.50-2.44(14H,m),2.8  
5(3H,s),4.24(1H,m),5.33-5.45(2H,m),6.19(1H,d,J=8.4Hz),6.84 δ 7.45  
(  
叠加 2H, 叠加 d,J=9.0Hz),7.11 δ 7.45(叠加 2H, 叠加 d,J=8.7Hz).  
IR(CHCl<sub>3</sub>):3516,3458,3029,3009,2925,2870,2840,2825,1708,1650,1593,1515,  
1493,1489 /cm.  
 $[\alpha]_D = +57.8^\circ$  (MeOH, c=1.00, 23°C).

No.2a-170

CDCl<sub>3</sub>, 300MHz

0.98(1H,d,J=10.2Hz),1.15 δ 1.34(交错 2H, 叠加 s),1.52-2.60(14H,m),4.2  
8(1H,m),5.33-5.54(2H,m),6.25(1H,d,J=8.2Hz),7.38-7.44(2H,m),7.74(1H,s),7.  
81-7.86(2H,m).  
IR(CHCl<sub>3</sub>):3517,3448,3427,3024,3018,2925,2870,2869,1708,1650,1562,1525,  
1600 /cm.  
 $[\alpha]_D = +61.6^\circ$  (MeOH, c=1.00, 23°C).

No.2a-171

CDCl<sub>3</sub>, 300MHz

0.96(1H,d,J=10.2Hz),1.11 δ 1.23(交错 2H, 叠加 s),1.52-2.42(14H,m),2.48  
(3H,s),4.21(1H,m),5.31-5.52(2H,m),6.06(1H,d,J=8.2Hz),6.97 δ 7.53  
(  
交错 1H, 叠加 d,J=1.2Hz).  
IR(CHCl<sub>3</sub>):3452,3118,3028,3007,2925,2870,2869,1708,1648,1554,1509 /cm.  
 $[\alpha]_D = +52.4^\circ$  (MeOH, c=1.00, 23°C).

No.2a-172

CDCl<sub>3</sub>, 300MHz

0.96(1H,d,J=10.2Hz),1.09 δ 1.28(交错 2H, 叠加 s),1.50-2.40(14H,m),2.6  
6(3H,s),4.24(1H,m),5.35-5.51(2H,m),5.98(1H,d,J=8.7Hz),7.03 δ 7.07  
(  
交错 1H, 叠加 d,J=5.4Hz).  
IR(CHCl<sub>3</sub>):3451,3031,3018,2925,2870,2866,1708,1647,1542,1497 /cm.  
 $[\alpha]_D = +51.2^\circ$  (MeOH, c=1.00, 23°C).

No.2a-173

CDCl<sub>3</sub>, 300MHz

0.98(1H,d,J=10.2Hz),1.10 δ 1.23(交错 2H, 叠加 s),1.50-2.45(14H,m),4.2  
2(1H,m),5.35-5.49(2H,m),6.05(1H,d,J=8.4Hz),7.38 δ 7.75(交错 1H, 叠加  
d,J=1.6Hz).  
IR(CHCl<sub>3</sub>):3451,3011,3029,3011,2925,2870,1708,1652,1529,1600 /cm.  
 $[\alpha]_D = +50.6^\circ$  (MeOH, c=1.01, 23°C).

No.2a-174

CDCl<sub>3</sub>, 300MHz

0.98(1H,d,J=10.2Hz),1.13 δ 1.28(交错 2H, 叠加 s),1.53-2.50(14H,m),4.2  
9(1H,m),5.33-5.51(2H,m),7.03(1H,d,J=8.4Hz),7.82 δ 8.16(交错 1H, 叠加  
d,J=8.8Hz).  
IR(CHCl<sub>3</sub>):3417,3118,3028,3014,2925,2870,1708,1645,1580 /cm.  
 $[\alpha]_D = +48.8^\circ$  (MeOH, c=1.02, 23°C).

No.2a-175

CDCl<sub>3</sub>, 300MHz

0.97(1H,d,J=10.2Hz),1.14 δ 1.28(交错 2H, 叠加 s),1.50-2.52(14H,m),2.5  
2(3H,s),4.29(1H,m),5.34-5.51(2H,m),7.78(1H,d,J=8.0Hz),7.84 δ 7.52  
(  
交错 1H, 叠加 d,J=5.4Hz).  
IR(CHCl<sub>3</sub>):3229,3093,3028,3015,2924,2871,1708,1640,1526 /cm.

$[\alpha]_D = +45.0^\circ$  (MeOH,  $c=1.01, 25^\circ\text{C}$ ).

No.2a-176

CDCl<sub>3</sub>, 300MHz

0.96(1H, d, J=10.5Hz), 1.09 δ 1.28(  $\chi_1\chi_2$  2H,  $\chi_1\chi_2$  s), 1.52-2.46(14H, m), 2.4  
0(3H, s), 4.24(1H, m), 5.35-5.51(2H, m), 6.05(1H, d, J=8.7Hz), 6.95(1H,  
m), 7.57(1H, d, J=8.8Hz).

IR(CHCl<sub>3</sub>): 3517, 3444, 3105, 2934, 2918, 2926, 2870, 1789, 1709, 1649, 1636, 1507/  
cm.

$[\alpha]_D = +54.8^\circ$  (MeOH,  $c=1.01, 25^\circ\text{C}$ ).

m.p. 97.0-98.0°C

No.2a-177

CDCl<sub>3</sub>, 300MHz

0.97(1H, d, J=10.2Hz), 1.11 δ 1.28(  $\chi_1\chi_2$  2H,  $\chi_1\chi_2$  s), 1.52-2.46(14H, m), 2.9  
8(3H, s), 4.37(1H, m), 5.34-5.50(2H, m), 6.85(1H, d, J=8.8Hz), 7.80(1H, d, J=8.7Hz  
, 8.10(1H, d, J=8.8Hz).

IR(CHCl<sub>3</sub>): 3395, 3121, 3031, 3019, 2912, 2925, 2871, 1789, 1709, 1640, 1557, 1533  
/cm.

$[\alpha]_D = +22.8^\circ$  (MeOH,  $c=1.01, 25^\circ\text{C}$ ).

m.p. 109.0-112.0°C

No.2a-178

CDCl<sub>3</sub>, 300MHz

0.96(1H, d, J=10.5Hz), 1.10 δ 1.23(  $\chi_1\chi_2$  2H,  $\chi_1\chi_2$  s), 1.51-2.46(14H, m), 4.2  
4(1H, m), 5.35-5.50(2H, m), 6.09(1H, d, J=8.4Hz), 7.17-7.31(6H, m), 7.95(1H, d, J=  
1.5Hz).

IR(CHCl<sub>3</sub>): 3610, 3451, 3062, 3031, 3023, 3011, 2925, 2870, 2862, 1709, 1651, 1622,  
1585, 1497, 1477/cm.

$[\alpha]_D = +47.9^\circ$  (MeOH,  $c=1.01, 25^\circ\text{C}$ ).

No.2a-179

CDCl<sub>3</sub>, 300MHz

0.96(1H, d, J=10.2Hz), 1.14 δ 1.24(  $\chi_1\chi_2$  2H,  $\chi_1\chi_2$  s), 1.52-2.46(14H, m), 4.3  
0(1H, m), 5.36-5.52(2H, m), 6.73(1H, d, J=9.0Hz), 6.28 δ 7.37(  $\chi_1\chi_2$  1H,  $\chi_1\chi_2$   
d, J=6.0Hz).

IR(CHCl<sub>3</sub>): 3509, 3428, 3115, 3094, 3025, 3014, 2925, 2871, 2866, 1709, 1649, 1529,  
1510 /cm.

$[\alpha]_D = +51.0^\circ$  (MeOH,  $c=1.02, 25^\circ\text{C}$ ).

No.2a-180

CDCl<sub>3</sub>, 300MHz

0.95(1H, d, J=10.2Hz), 1.14 δ 1.24(  $\chi_1\chi_2$  2H,  $\chi_1\chi_2$  s), 1.52-2.46(14H, m), 3.8  
9(3H, s), 4.21(1H, m), 5.35-5.50(2H, m), 6.08(1H, d, J=8.4Hz), 6.46 δ 7.04 (  $\chi_1\chi_2$   
1H,  $\chi_1\chi_2$  d, J=1.6Hz).

IR(CHCl<sub>3</sub>): 3516, 3460, 3114, 3021, 3010, 2925, 2871, 1709, 1648, 1546, 1511, 1477  
/cm.

$[\alpha]_D = +49.1^\circ$  (MeOH,  $c=1.01, 25^\circ\text{C}$ ).

No.2a-181

CDCl<sub>3</sub>, 300MHz

0.97(1H, d, J=10.2Hz), 1.14 δ 1.23(  $\chi_1\chi_2$  2H,  $\chi_1\chi_2$  s), 1.52-2.46(14H, m), 2.4  
2(3H, s), 4.21(1H, m), 5.34-5.52(2H, m), 6.07(1H, d, J=8.5Hz), 7.37 δ 8.17 (  $\chi_1\chi_2$   
1H,  $\chi_1\chi_2$  d, J=8.3Hz).

IR(CHCl<sub>3</sub>): 3510, 3301, 3112, 3028, 3007, 2924, 2871, 2862, 1709, 1658, 1534 /cm.  
 $[\alpha]_D = +41.0^\circ$  (MeOH,  $c=0.96, 25^\circ\text{C}$ ).

No.2a-182

**CDCl<sub>3</sub>, 800MHz**  
**0.96(1H,d,J=10.2Hz),1.11**  $\delta$  **1.23**( $\frac{1}{2}$ z 2H,  $\frac{1}{2}$ z a),**1.53-2.48**(14H,m),**2.51**(2H,s),**4.21**(1H,m),**5.85-5.51**(2H,m),**6.05**(1H,d,J=0.1Hz),**7.38**  $\delta$  **7.78** ( $\frac{1}{2}$ z 2 1H,  $\frac{1}{2}$ z 2 d,J<1.0Hz).  
**IR(CHCl<sub>3</sub>):** 3508,3450,3109,3034,3012,2925,2870,2866,1708,1656,1585,1498,1471 /cm<sup>-1</sup>.  
**[α]<sub>D</sub>=+52.9°** (MeOH,c=0.56,25°C).

No.2n-188  
 $\text{CDCl}_3$ , 800MHz  
 0.96(1H,d,J=10.6Hz),1.13  $\delta$  1.22(2H,t,J=8.5Hz),1.53-2.48(14H,m),4.85(1H,m),5.28-5.51(2H,m),5.17(1H,d,J=6.7Hz),7.01-7.08(3H,m),7.14  $\delta$  7.62(2H,t,J=8.7Hz),7.27-7.34(2H,m).  
 IR(CHCl<sub>3</sub>):3028,3015,2925,2870,3005,1789,1703,1645,1518,1504,1528,1499/cm.  
 $[\alpha]_D^{25}=+64.8^\circ$  (MeOH,c=1.02,23°C).

No.8n-184  
 $\text{CDCl}_3$ , 800MHz  
 1.01(1H,d,J=10.2Hz), 1.16  $\eta$  1.25(br,s,2H, $\chi_2\chi_1$  s), 1.55-2.80(14H,m), 4.8 5(1H,m), 5.85-5.86(2H,m), 8.42(1H,d,J=8.7Hz), 7.48-7.52(2H,m), 7.73(1H,dd,J =1.8  $\eta$ , 5.4Hz), 7.83-7.89(2H,m), 8.81(1H,m), 9.69(1H,d,J=1.5Hz).  
 IR(CHCl<sub>3</sub>):2841,3031,3014,2925,2870,2860,1739,1708,1650,1604,1518,1488 /cm.  
 $[\alpha]_D^{25}=+55.5^\circ$  (MeOH,c=1.00,23°C).

No.2a-185  
 $\text{CDCl}_3, 300\text{MHz}$   
 1.00(1H,d,J=10.2Hz), 1.18 (m, 1.28(s), 2H, d,J=2.2Hz), 1.55-2.50(14H,m), 4.8  
 4(H,m), 5.35-5.54(2H,m), 6.38(1H,d,J=7.7Hz), 7.87(1H,t,J=7.4Hz), 7.90(1H,m),  
 7.57-7.59(2H,m), 7.79(1H,dd,J=1.8 Hz, 8.1Hz), 7.89(1H,d,J=7.8Hz), 8.89(1  
 H,d,J=1.8Hz).  
 IR(CHCl<sub>3</sub>): 3451, 3030, 3020, 2870, 2865, 1702, 1652, 1632, 1603, 1586, 1514, 1469,  
 1448 /cm.  
 $[\alpha]_D = +59.4^\circ$  (MeOH,  $c=1.01, 24^\circ\text{C}$ ).

No.2a-188  
 $\text{CDCl}_3$ , 200MHz  
 1.00(1H,d,J=10.5Hz), 1.17  $\delta$ , 1.25( $\text{m}$ , 2H,  $\text{z}+\text{z}'$ ,  $\text{e}$ ), 1.54-2.50(14H,m), 4.83(1H,m), 5.85-5.54(2H,m), 6.87(1H,d,J=6.7Hz), 7.87(1H,t,J=7.4Hz), 7.51(1H,t,J=7.8Hz), 7.56(1H,m), 7.70(1H,dd,J=1.8  $\delta$ , 8.4Hz), 7.97(3H,m).  
 IR(CHCl<sub>3</sub>): 2845, 3030, 2914, 2924, 2870, 2671, 1739, 1708, 1652, 1577, 1517, 1488, 1471 /cm<sub>-1</sub>.  
 $[\alpha]_D^{25}=+72.2^{\circ}$  (MeOH,  $c=1.00, 24^{\circ}\text{C}$ ).

No.2a-187  
 $\text{CDCl}_3$ , 800MHz  
 1.00(1H,d,J=9.8Hz).1.16  $\text{W}$ : 1.25( $\text{z}-\text{z}$ ) 8H,- $\text{z}-\text{z}$  s), 1.54-2.58(14H,m), 4.07(3H,s), 4.37(1H,m), 5.80-5.84(2H,m), 7.34(1H,m), 7.47(1H,s), 7.47-7.60(2H,m), 7.93(1H,d,J=7.8Hz), 8.43(1H,s), 8.49(1H,d,J=9.0Hz).  
 IR(CHCl<sub>3</sub>): 3397, 3074, 3027, 3020, 3009, 2924, 1738, 1708, 1647, 1638, 1584, 1465, 1453 /cm.  
 $[\alpha]_D^{25} \approx +48.7^\circ$  (MeOH, c=1.01, 25°C).

No.2a-188  
 $\text{CDCl}_3$ , 300MHz  
 0.97(1H,d,J=10.3Hz),1.11 d 1.23(s,2H,2J<sub>H,H</sub>=8),1.53-1.56(14H,m),4.23(1H,m),5.87-5.90(2H,m),6.10(1H,d,J=9.0Hz),6.30(1H,m),6.51(1H,m),6.97(1H,m)

H<sub>2</sub>m), 10.51(1H, brs).  
IR(CHCl<sub>3</sub>): 3450, 3226, 3112, 3039, 3015, 2925, 2871, 2645, 1701, 1616, 1558, 1516  
/cm.  
[α]<sub>D</sub>=+50.6° (MeOH, c=1.01, 24°C).

No.2a-189  
CDCl<sub>3</sub> 300MHz  
0.94(1H,d,J=9.9Hz), 1.11 δ 1.33(2H, d, J=9.9 Hz), 1.50-2.46(14H,m), 3.93(3H,s), 4.18(1H,m), 5.35-5.52(2H,m), 6.08(1H,d,J=9.9Hz), 6.09(1H,m), 6.48(1H,m), 6.78(1H,m).  
IR(CHCl<sub>3</sub>): 3453, 3102, 3028, 3007, 2925, 2871, 2668, 1739, 1708, 1650, 1536, 1499, 1471 /cm.  
[α]<sub>D</sub>=+49.8° (MeOH, c=1.01, 24°C).  
m.p. 101.5-103.8°C

No.2a-190  
CDCl<sub>3</sub> 300MHz  
0.94(1H,d,J=10.8Hz), 1.11 δ 1.21(2H, d, J=10.8 Hz), 1.54-2.47(14H,m), 4.28(1H,m), 5.38-5.52(2H,m), 6.06(1H,d,J=9.0Hz), 6.34(1H,m), 6.75(1H,m), 6.36(1H,m), 6.71(1H,brs).  
IR(CHCl<sub>3</sub>): 3470, 3215, 3030, 3020, 3010, 2925, 2871, 2664, 1709, 1618, 1684, 1510/cm.  
[α]<sub>D</sub>=+48.8° (MeOH, c=1.01, 24°C).

No.2a-191  
CDCl<sub>3</sub> 300MHz  
0.96(1H,d,J=10.2Hz), 1.11 δ 1.22(2H, d, J=10.2 Hz), 1.55-2.44(14H,m), 3.56(3H,s), 4.20(1H,m), 5.35-5.51(2H,m), 5.98(1H,d,J=8.4Hz), 6.27(1H,dd,J=1.8 δ 2.7Hz), 6.56(1H,t,J=2.7Hz), 7.19(1H,t,J=1.8Hz).  
IR(CHCl<sub>3</sub>): 3453, 3031, 3018, 3006, 2925, 2871, 2668, 1738, 1710, 1684, 1609, 1556, 1498 /cm.  
[α]<sub>D</sub>=+48.1° (MeOH, c=1.01, 24°C).

No.2a-192  
CDCl<sub>3</sub> 300MHz  
0.96(1H,d,J=10.5Hz), 1.11 δ 1.21(2H, d, J=10.5 Hz), 1.48(2H,t,J=7.5Hz), 1.54-2.44(14H,m), 3.98(2H,q,J=7.5Hz), 4.31(1H,m), 5.35-5.51(2H,m), 5.94(1H,d, J=8.4Hz), 6.27(1H,dd,J=1.8 δ 2.7Hz), 6.69(1H,t,J=2.7Hz), 7.36(1H,t,J=1.8Hz).  
IR(CHCl<sub>3</sub>): 3630, 3452, 3032, 3018, 3006, 2925, 2871, 2661, 1735, 1710, 1633, 1610, 1555, 1497 /cm.  
[α]<sub>D</sub>=+40.1° (MeOH, c=1.00, 24°C).

No.2a-193  
CDCl<sub>3</sub> 300MHz  
0.95(1H,d,J=10.2Hz), 1.10 δ 1.23(2H, d, J=10.2 Hz), 1.53-2.49(14H,m), 3.58(3H,s), 4.21(1H,m), 5.35-5.54(2H,m), 6.15(1H,d,J=8.1Hz), 6.52(1H,dd,J=1.8 δ 3.6Hz), 7.29(1H,t,J=3.6Hz), 7.94(1H,t,J=1.8Hz).  
IR(CHCl<sub>3</sub>): 3516, 3450, 3410, 3152, 3027, 3015, 2925, 2871, 2670, 1732, 1648, 1574, 1509 /cm.  
[α]<sub>D</sub>=+45.0° (MeOH, c=1.01, 24°C).

No.2a-194  
CDCl<sub>3</sub> 300MHz  
0.99(1H,d,J=10.2Hz), 1.11 δ 1.24(2H, d, J=10.2 Hz), 1.52-2.58(14H,m), 4.44(1H,m), 5.23-5.57(2H,m), 6.21(1H,d,J=8.6Hz), 7.35-7.50(2H,m), 7.83(1H,s), 7.86(1H,m), 8.31(1H,m).  
IR(CHCl<sub>3</sub>): 3448, 3067, 3018, 2925, 2870, 2668, 1708, 1651, 1615, 1498 /cm.

$[\alpha]_D = +55.7^\circ$  (MeOH, c=1.01, 23°C).

No.2a-195

CDCl<sub>3</sub>, 300MHz

1.01(1H,d,J=10.0Hz),1.06  
≡ 1.28(z<sub>2</sub>z<sub>1</sub> 2H, z<sub>2</sub>z<sub>1</sub> s),1.50-2.64(14H,m),2.6  
8(2H,s),4.40(1H,m),5.36-5.61  
H,m),6.03(1H,d,J=9.4Hz),7.80-7.42(2H,m),7.  
73-7.86(2H,m).

IR(CHCl<sub>3</sub>):3510,3434,3062,3029,3014,2924,2871,2868,1708,1660,1589,1539,  
1500 /cm.

$[\alpha]_D = +72.4^\circ$  (MeOH, c=1.00, 23°C).

m.p.111.0-112.0°C

No.2a-196

CDCl<sub>3</sub>, 300MHz

0.42  
≡ 1.04(z<sub>2</sub>z<sub>1</sub> 2H, z<sub>2</sub>z<sub>1</sub> s),0.60(1H,d,J=10.0Hz),1.11-2.46(14H,m),2.2  
4(3H,s),4.02(1H,m),5.23-5.44(2H,m),5.58(1H,d,J=8.8Hz),7.87-7.91(2H,m),7.  
42-7.48(3H,m),7.93(1H,s).

IR(CHCl<sub>3</sub>):3419,3114,3025,3008,2924,2871,2868,1787,1708,1638,1540,1519  
/cm.

$[\alpha]_D = +48.7^\circ$  (MeOH, c=1.01, 23°C).

No.2a-197

CDCl<sub>3</sub>, 300MHz

0.95(1H,d,J=10.0Hz),1.09  
≡ 1.23(z<sub>2</sub>z<sub>1</sub> 2H, z<sub>2</sub>z<sub>1</sub> s),1.54-2.46(18H,m),2.7  
7(4H,brs),4.21(1H,m),5.32-5.54(2H,m),6.02(1H,d,J=8.6Hz),7.43(1H,s).

IR(CHCl<sub>3</sub>):3445,3101,3024,3014,2928,2855,2861,1739,1708,1646,1550,1507  
/cm.

$[\alpha]_D = +51.9^\circ$  (MeOH, c=1.01, 23°C).

No.2a-198

CDCl<sub>3</sub>, 300MHz

0.96(1H,d,J=10.2Hz),1.11  
≡ 1.22(z<sub>2</sub>z<sub>1</sub> 3H, z<sub>2</sub>z<sub>1</sub> s),1.50-2.44(14H,m),4.3  
4(1H,m),4.42(2H,s),5.85-5.49(2H,m),6.25(1H,d,J=8.1Hz),7.88(1H,m),7.48(1  
H,dd,J=1.5  
≡ 7.5Hz),7.49(1H,d,J=8.1Hz),7.80-7.68(1H,m),7.68(1H,dd,J=1.  
8  
≡ 7.8Hz),8.02(1H,d,J=1.8Hz),8.19(1H,dd,J=1.5  
≡ 8.1Hz).

IR(CHCl<sub>3</sub>):3448,3080,3012,2925,2870,1739,1708,1671,1558,1559,1514,1473  
/cm.

$[\alpha]_D = +56.9^\circ$  (MeOH, c=1.01, 24°C).

No.2a-199

CDCl<sub>3</sub>, 300MHz

0.96(1H,d,J=10.2Hz),1.11  
≡ 1.22(z<sub>2</sub>z<sub>1</sub> 3H, z<sub>2</sub>z<sub>1</sub> s),1.51-2.46(14H,m),3.4  
0(1H,m),3.76(1H,m),4.24(1H,m),5.88-5.51(2H,m),6.25(1H,m),7.16(1H,m),7.2  
4-7.53(2H,m),7.46(1H,d,J=7.5Hz),7.52-7.60(2H,m),7.85(1H,dd,J=1.8  
and 4.  
5Hz).

IR(CHCl<sub>3</sub>):3583,3447,3062,3028,3018,2924,2871,2868,1708,1651,1600,1557,  
1514,1471 /cm.

$[\alpha]_D = +54.8^\circ$  (MeOH, c=1.00, 23°C).

No.2a-200

CDCl<sub>3</sub>, 300MHz

0.96(1H,d,J=10.2Hz),1.12  
≡ 1.23(z<sub>2</sub>z<sub>1</sub> 2H, z<sub>2</sub>z<sub>1</sub> s),1.51-2.46(14H,m),4.3  
5(1H,m),5.84-5.51(2H,m),6.26(1H,d,J=8.4Hz),7.02  
≡ 7.10(z<sub>2</sub>z<sub>1</sub> 1H, z<sub>2</sub>z<sub>1</sub>  
d,J=12.8Hz),7.23-7.33(4H,m),7.50(1H,m),7.64(1H,dd,J=1.8  
and 7.8Hz),7.8  
2(1H,d,J=1.8Hz).

IR(CHCl<sub>3</sub>):3450,3080,3028,3014,2925,2871,2862,1708,1658,1596,1542,1518,  
1478 /cm.

$[\alpha]_D = +62.8^\circ$  (MeOH, c=1.00, 24°C).

No.2a-201

CDCl<sub>3</sub> 300MHz

0.95(1H,d,J=9.9Hz),1.15  
및 1.22(각각 3H, 각각 s),1.55-2.60(14H,m),4.26(1H,m),5.25-5.68(2H,m),7.14(1H,d,J=9.9Hz),7.34  
및 7.40(각각 1H, 각각 d, J=12.9Hz),7.53-7.78(4H,m),8.25-8.80(2H,m),8.73(1H,d,J=1.5Hz).  
IR(CHCl<sub>3</sub>):3448,3359,3337,3061,3030,3016,2925 2870,1728,1708 1652,160  
8,1521,1483,1472,1809 /cm.  
[α]<sub>D</sub>=+61.1° (MeOH,c=1.01,23°C).

No.2a-202

CDCl<sub>3</sub> 300MHz

0.96(1H,d,J=10.2Hz),1.09  
및 1.23(각각 3H, 각각 s),1.52-2.43(14H,m),2.6  
3(3H,s),4.25(1H,m),5.23-5.49(2H,m),6.19(1H,d,J=8.4Hz),7.10  
및 7.58 (각각 2H, 각각 d,J=9.0Hz),7.21(1H,m),7.30-7.33(2H,m),7.46(1H,d,J=7.5Hz)  
IR(CHCl<sub>3</sub>):3511,3458,3062,3032,3014,2925 2870,1739,1708,1650,1595,1556,  
1516,1482,1471 /cm.  
[α]<sub>D</sub>=+60.2° (MeOH,c=1.01,23°C).

No.2a-203

CDCl<sub>3</sub> 300MHz

0.98(1H,d,J=10.5Hz),1.09  
및 1.23(각각 3H, 각각 s),1.52-2.43(14H,m),4.2  
3(1H,m),5.25-5.51(2H,m),6.93(1H,d,J=8.7Hz),6.56(1H,dd,J=0.9  
및 1.8Hz),  
7.48(1H,t,J=1.8Hz),7.92(1H,dd,J=0.9  
및 1.8Hz).  
IR(CHCl<sub>3</sub>):3517,3450,3134,3031,3008,2925,2870,2857,1708,1656,1588,1570,  
1514 /cm.  
[α]<sub>D</sub>=+46.7° (MeOH,c=0.92,23°C).

No.2b-1

[α]<sub>D</sub>= +25.6° (MeOH,c=1.01,23°C).

No.2b-2

[α]<sub>D</sub>= +88.9° (MeOH,c=1.01,24°C).

No.2c-1

[α]<sub>D</sub>= +80.5° (MeOH,c=1.01,22°C).

No.2c-2

[α]<sub>D</sub>= +55.8° (MeOH,c=0.92,22°C).

No.2c-3

[α]<sub>D</sub>= +54.7° (MeOH,c=1.01,22°C).

No.2d-1

[α]<sub>D</sub>= -6.2° (MeOH,c=1.00,21°C).

No.2d-2

[α]<sub>D</sub>=+15.8° (MeOH,c=0.34,22°C).

No.2d-3

[α]<sub>D</sub>=+81.6° (MeOH,c=1.01,22°C).

No.2e-1

[α]<sub>D</sub>= -9.4° (MeOH,c=1.00,22°C).

No.2e-2

[α]<sub>D</sub>= -1.8° (MeOH,c=1.02,23°C).

No.2e-3  
[ $\alpha$ ]<sub>D</sub>= -6.7° (MeOH, c=1.01, 23°C).

No.2f-1  
[ $\alpha$ ]<sub>D</sub>= +6.8° (MeOH, c=1.01, 23°C).

No.2f-2  
[ $\alpha$ ]<sub>D</sub>= -2.8° (MeOH, c=1.00, 23°C).

No.2f-3  
[ $\alpha$ ]<sub>D</sub>= -8.5° (MeOH, c=1.01, 23°C).

No.2g-1  
[ $\alpha$ ]<sub>D</sub>= -54.6° (MeOH, c=1.01, 24°C).

No.8a-2  
CDCl<sub>3</sub>, 300MHz  
0.98-2.18(14H, m), 2.81(2H, t, J=7.2Hz), 3.35-3.40(1H, m), 3.10-3.20(1H, m),  
5.00(1H, d, J=6.9Hz), 5.80-5.48(3H, m), 6.75(1H, d, J=10.2Hz), 7.88-7.82(6H, m).  
IR(CHCl<sub>3</sub>): 3266, 3028, 2954, 2874, 1709, 1620, 1448, 1412, 1318, 1141, 970, 892/cm.  
[ $\alpha$ ]<sub>D</sub>=+20.8±0.6° (CHCl<sub>3</sub>, c=1.05, 24°C).

No.8a-3  
CDCl<sub>3</sub>, 300MHz  
0.95-2.00(14H, m), 2.20-2.29(3H, m), 3.00-3.05(1H, m), 3.66(3H, s), 5.00(1H, d,  
J=6.6Hz), 5.13-5.29(2H, m), 7.88-7.52(8H, m), 7.58-7.66(2H, m), 7.69-  
7.75(2H, m), 7.93-7.98(2H, m).  
IR(CHCl<sub>3</sub>): 3376, 3018, 2946, 2868, 1727, 1594, 1436, 1395, 1322, 1157, 1095, 890  
/cm.  
[ $\alpha$ ]<sub>D</sub>=+2.8±0.4° (CHCl<sub>3</sub>, c=1.08, 23°C).  
mp.65-66.5°C

No.8a-4  
CDCl<sub>3</sub>, 300MHz  
0.93-2.05(14H, m), 2.15-2.32(1H, m), 2.81(2H, t, J=7.2Hz), 3.01-3.10(1H, m),  
5.18-5.81(8H, m), 7.88-7.52(8H, m), 7.58-7.66(2H, m), 7.69-7.76(2H, m), 7.92-  
7.98(2H, m)  
IR(CHCl<sub>3</sub>): 3374, 3260, 3020, 2948, 2868, 1708, 1594, 1479, 1396, 1319, 1156, 1095,  
1052, 891/cm.  
[ $\alpha$ ]<sub>D</sub>=+13.1±0.5° (CHCl<sub>3</sub>, c=1.16, 24°C).

No.3a-8  
CD<sub>3</sub>OD 300MHz  
1.04-1.95(14H, m), 2.07(3H, t, J=7.6Hz), 2.14-2.32(1H, m), 2.94-3.00(1H, m),  
5.04-5.25(3H, m), 7.88-7.52(8H, m), 7.68-7.71(2H, m), 7.78-7.85(2H, m), 7.91-  
7.97(2H, m).  
IR(KBr): 3421, 3278, 2951, 2873, 1662, 1481, 1409, 1317, 1156, 1097, 1057, 895/cm.

[ $\alpha$ ]<sub>D</sub>=-15.8±0.5° (CHCl<sub>3</sub>, c=1.06, 23°C).  
mp.105-112°C

No.8a-11  
CDCl<sub>3</sub>, 300MHz  
0.90-2.04(14H, m), 2.08-2.19(1H, m), 2.88(2H, t, J=7.2Hz), 2.95-3.04(1H, m),  
5.17-5.82(8H, m), 7.56-7.68(2H, m), 7.88-7.95(2H, m).  
IR(CHCl<sub>3</sub>): 3260, 3020, 2948, 2868, 1707, 1569, 1456, 1353, 1325, 1288, 1160, 1098,  
1068, 1008, 892/cm.

$[\alpha]_D = +8.3 \pm 0.5^\circ$  (CHCl<sub>3</sub>, c=1.00, 22°C).

No.8a-18

CDCl<sub>3</sub> 300MHz

0.60-1.90(14H,m), 1.95-2.04(1H,m), 2.27(2H,t,J=7.2Hz), 2.68(6H,s), 2.90-2.98(1H,m), 4.85-5.00(2H,m), 5.18(1H,d,J=7.2Hz), 7.18(1H,d,J=7.5Hz), 7.45-7.60(2H,m), 8.25-8.33(2H,m), 8.55(1H,d,J=8.7Hz).

IR(CHCl<sub>3</sub>): 3272, 3020, 2948, 2866, 2782, 1708, 1655, 1407, 1311, 1229, 1160,

1142, 1070, 942, 891/cm.

$[\alpha]_D = -19.7 \pm 0.8^\circ$  (CHCl<sub>3</sub>, c=1.00, 23.8°C).

No.8a-31

CDCl<sub>3</sub> 300MHz

0.60-1.85(14H,m), 2.02-2.08(1H,m), 2.30(2H,t,J=7.2Hz), 2.85-2.95(1H,m), 2.88(3H,s), 4.80-4.82(2H,m), 4.98(1H,d,J=8.9Hz), 7.50-7.70(8H,m), 7.92-7.98(1H,m), 8.07(1H,d,J=8.4Hz), 8.39(1H,dd,J=1.5&7.5Hz), 8.65(1H,d,J=8.7Hz).

IR(CHCl<sub>3</sub>): 3374, 3016, 2948, 2868, 1727, 1506, 1485, 1318, 1160, 1133, 1106, 1051,

954, 890/cm.

$[\alpha]_D = -39.8 \pm 0.8^\circ$  (CHCl<sub>3</sub>, c=1.07, 22°C).

No.8a-32

CDCl<sub>3</sub> 300MHz

0.60-1.90(14H,m), 1.95-2.05(1H,m), 2.27(2H,t,J=7.2Hz), 2.90-2.96(1H,m), 4.85-5.00(2H,m), 5.23(1H,d,J=6.6Hz), 7.50-7.72(8H,m), 7.95(1H,d,J=8.1Hz), 8.07(1H,d,J=8.4Hz), 8.29(1H,dd,J=1.2&7.5Hz), 8.66(1H,d,J=9.0Hz).

IR(CHCl<sub>3</sub>): 3270, 3020, 2948, 2868, 1708, 1455, 1412, 1317, 1159, 1182, 1104, 1079, 1051, 953, 891/cm.

$[\alpha]_D = -39.8 \pm 0.6^\circ$  (CHCl<sub>3</sub>, c=1.06, 23°C).

No.8a-33

CD<sub>3</sub>OD 300MHz

0.94-1.84(14H,m), 1.96-2.08(8H,m), 2.77-2.84(1H,m), 4.67-4.84(3H,m), 7.55-7.75(8H,m), 8.02(1H,d,J=7.5Hz), 8.12-8.28(2H,m), 8.74(1H,d,J=8.7Hz).

IR(KBr): 3482, 3298, 2951, 2872, 1584, 1412, 1318, 1159, 1184, 1107, 1082, 1058, 986/cm.

$[\alpha]_D = -79.9 \pm 1.9^\circ$  (CH<sub>3</sub>OH, c=1.00, 23°C).

No.8a-34

CDCl<sub>3</sub> 300MHz

0.97-1.91(14H,m), 2.18-2.20(1H,m), 2.42(2H,t,J=7.2Hz), 3.00-3.07(1H,m), 5.06-5.34(2H,m), 5.38(1H,d,J=8.9Hz), 7.57-7.68(2H,m), 7.82-8.00(4H,m), 8.48(1H,d,J=1.2Hz)

IR(CHCl<sub>3</sub>): 3260, 3020, 2948, 1708, 1408, 1319, 1154, 1129, 1078, 958, 893/cm.

$[\alpha]_D = +20.7 \pm 0.6^\circ$  (CHCl<sub>3</sub>, c=1.07, 22°C).

No.8a-35

CD<sub>3</sub>OD 300MHz

1.08-2.20(m,17H), 2.97(m,1H), 5.02(m,2H), 7.84(m,2H), 8.00(m,4H), 9.43(S,1H).

IR(KBr): 3880, 3286, 1862, 1407, 1316, 1158, 1180, 1078/cm.

$[\alpha]_D = +40$

$[\alpha]_{D,\text{ref}} = +20.9 \pm 0.6^\circ$  (CH<sub>3</sub>OH, c=1.04, 23°C).

No.8d-1

CDCl<sub>3</sub> 300MHz

0.98-2.55(m,17H), 5.02(m,1H), 5.24(m,2H), 6.48(m,1H), 7.85-7.80(m,8H), 7.85-8.00(m,2H)

IR(ν<sub>max</sub>): 3275, 1545, 1160, 1094, 7 8, 719, 689, 591, 657/cm.  
 $[\alpha]_D = +19.0 \pm .6^\circ$  (CH<sub>3</sub>OH, c=1.010, 2 .5°C).  
 원소분석 (C<sub>20</sub>H<sub>22</sub>NO<sub>2</sub> 1/2Ca 1.0 H<sub>2</sub>O)  
 계산치: C, 57.94; H, 6.52; N, 3.35; Ca, 4.89; H<sub>2</sub>O, 4.35  
 측정치: C, 57.80; H, 6.68; N, 3.68; Ca, 5.08; H<sub>2</sub>O, 4.50

No.3d-8  
 $[\alpha]_D = -2 .7 \pm .6^\circ$  (CHCl<sub>3</sub>, c=1.00, 24°C).

No.3d-7  
 $[\alpha]_D = -3.2 \pm 0.4^\circ$  (CHCl<sub>3</sub>, c=1.08, 22°C).  
 mp. 65-67°C

No.3d-8  
 $[\alpha]_D = -14.6 \pm 0.5^\circ$  (CHCl<sub>3</sub>, c=1.07, 24°C).

No.3d-9  
 $[\alpha]_D = +12.2 \pm 0.5^\circ$  (CH<sub>3</sub>OH, c=1.00, 23°C).  
 mp. 119-125°C

No.3d-10  
 $[\alpha]_D = +39.7 \pm 0.8^\circ$  (CHCl<sub>3</sub>, c=1.07, 22°C).

No.3d-11  
 $[\alpha]_D = +29.2 \pm 0.7^\circ$  (CHCl<sub>3</sub>, c=1.06, 22°C).

No.3d-12  
 $[\alpha]_D = +78.4 \pm 1.1^\circ$  (CH<sub>3</sub>OH, c=1.03, 24°C).

No.3d-14  
 $[\alpha]_D = -20.6 \pm 0.6^\circ$  (CHCl<sub>3</sub>, c=1.07, 22°C).

No.3d-15  
 $[\alpha]_{D,\text{obs}} = -28.0 \pm 0.7^\circ$  (CH<sub>3</sub>OH, c=1.08, 24.5°C).

No.3d-16  
 $[\alpha]_D = -8.7 \pm 0.5^\circ$  (CHCl<sub>3</sub>, c=1.06, 22°C).

No.3d-17  
 CDCl<sub>3</sub> 800MHz  
 0.80-2.15(m, 34H), 2.82(t, J=7Hz, 3H), 3.68(t, J=7Hz, 2H), 3.02(m, 1H), 2.18  
 (m, 24H), 3.82(t, J=7Hz, 3H), 3.68(t, J=7Hz, 2H), 3.02(m, 1H), 5.22(m, 2H), 6.58(d,  
 J=7Hz, 1H), 7.80(A<sub>2</sub>B<sub>2</sub>q-A<sup>2</sup>-B<sup>2</sup>, J=8Hz, 2H), 7.81(A<sub>2</sub>B<sub>2</sub>q-B<sup>2</sup>, J=8Hz, 2H),  
 9.88 (brs, 1H).  
 $[\alpha]_D = 0$   
 $[\alpha]_{D,\text{obs}} = -8.7 \pm 0.5^\circ$  (CHCl<sub>3</sub>, c=1.08, 23°C).

No.3d-24  
 $[\alpha]_D = +19.3 \pm 0.6^\circ$  (CHCl<sub>3</sub>, c=1.06, 23°C).

No.3d-26  
 CD<sub>3</sub>OD 800MHz  
 0.90-2.30(30H, m), 2.88(1H, m), 3.07(3H, q, J=7.0Hz), 3.00-3.40(3H, m), 7.20-  
 7.60(4H, m), 7.95(1H, m).  
 IR(KBr): 3415, 3254, 1698, 1564, 1314, 1154/cm.

No.3d-28  
 CD<sub>3</sub>OD 800MHz

0.90-2.20(30H,m), 2.78(2H,s,J=7.0Hz), 2.93(1H,m), 5.00-5.30(2H,m), 7.40-7.50(2H,m), 7.60-7.77(2H,m).  
IR(KBr): 3435, 3280, 1562, 1328, 1304, 1151/cm.

#### No.3d-30

원소분석 (C<sub>50</sub>H<sub>22</sub>BrNO<sub>4</sub>SNa)

계산치: C 50.31; H 5.37; Br 16.70; N 2.93; S 6.70; Na 4.81

측정치: C 50.22; H 5.40; Br 16.67; N 2.88; S 6.41; Na 5.10

IR(KBr): 3425, 3280, 3085, 1697, 1570, 1410, 1321, 1165, 1155/cm.

#### No.3e-1

CD<sub>2</sub>OD 300MHz

0.71(1H,d,J=10.2Hz), 1.04(3H,s), 1.12(3H,s), 1.35-2.28(14H,m),

2.42(3H,s), 3.17-3.25(1H,m), 5.18-

5.89(2H,m), 7.37(2H,d,J=8.4Hz), 7.76(2H,d,J=8.4Hz).

IR(CHCl<sub>3</sub>): 3400, 3289, 2986, 2924, 2870, 1559, 1424, 1322, 1305, 1160, 1095, 1075,

1030/cm.

[α]<sub>D</sub>=+25.9±0.7°(CH<sub>3</sub>OH,c=1.00,23°C).

상기 실시예에서 제조한 화합물을 하기의 실험 실시예에서 제시하는 방법에 따라 생체내 활성 및 시험관내 활성을 시험하였다.

#### 실험 1 PGD<sub>2</sub> 수용체에의 결합

##### 물질 및 방법

###### (1) 인간 혈소판 막 분획의 제조

3.8% 나트륨 시트레이트를 함유하는 플라스틱 주사기를 사용하여 건강한 지원자(성인 남자 및 여자)의 정액으로부터 혈액 샘플을 수득하고, 플라스틱 시험관에 담고, 뒤집어서 부드럽게 혼합하였다. 그 다음, 샘플을 실온에서 1800 rpm으로 10분동안 원심분리시키고, PRP(혈소판이 많은 플라즈마: platelet rich plasma)를 함유하는 상청액을 수집하였다. PRP를 실온에서 2300 rpm으로 22분동안 재원심분리시켜 혈소판을 수득하였다. 혈소판을 균질화기 (울트라-투락스(Ultra-Turrax))를 사용하여 균질화시키고, 4°C에서 20,000 rpm으로 10분간 3회 원심분리시켜 혈소판막 분획을 수득하였다. 단백질 측정을 한 후, 막 분획을 2 mg/ml가 되도록 조정하여 사용할 때까지 -80°C의 냉장고에서 보존하였다.

###### (2) PGD<sub>2</sub> 수용체에의 결합

결합-반응 용액(50mM 트리스(Tris)/HCl, pH 7.4, 5 mM MgCl<sub>2</sub>)에 인간 혈소판 막 분획(0.1 mg) 및 5nM [<sup>3</sup>H]PGD<sub>2</sub>(115 Ci/mmol)를 첨가하고, 4°C에서 90분간 반응시켰다. 반응이 완료된 후, 반응 혼합물을 유리성유 여과지를 통해 여과하고, 냉각된 식염수로 수 회 세척하고, 여과지에 잔류하는 방사능을 측정하였다. 총 결합에서 비-특이성 결합 (10μM PGD<sub>2</sub>의 존재하의 결합)을 빼서 특이성 결합을 계산하였다. 각 화합물의 결합-억제 활성은 결합률 50% 억제하는데 필요한 농도(IC<sub>50</sub>)로 표현되고, 이것은 화합물의 존재하의 결합 비율(%)을 좌표에 나타내어 치환 곡선을 그려서 결정하며, 이때 시험 화합물의 부재하의 결합비율은 100%이다. 결과를 하기 표에 제시하였다.

| 화합물 번호 | 활성 (μM) | 화합물 번호 | 활성 (μM) |
|--------|---------|--------|---------|
| 3a-4   | 0.6     | 2a-4   | 0.54    |
| 1a-115 | 8.6     | 2a-17  | 0.12    |
| 1a-28  | 0.045   | 2a-21  | 5.2     |
| 1a-47  | 0.0086  | 2a-28  | 0.046   |
| 1a-100 | 0.56    | 2a-95  | 1.5     |
| 1a-176 | 0.047   | 2a-109 | 0.003   |
| 1a-2   | 0.13    | 1a-162 | 0.027   |

#### 실험 2 인간 혈소판을 사용한 PGD<sub>2</sub> 수용체에 대한 길항 활성 측정

주사기 용적의 1/9를 시트르산/덱스트로즈 용액으로 미리 채운 주사기를 사용하여 건강한 지원자로부터 말초 혈액을 수득하였다. 주사기를 10분 동안 180×g에서 원심 분리시켜 상청액(PRP: 혈소판이 많은 플라즈마)을 수득하였다. 수득한 PRP를 3회 걸쳐 세척용 완충액으로 세척하고, 혈소판의 갯수를 마이크로 세포계수기(micro cell counter)를 사용하여 계수하였다. 혈소판의 최종 농도가  $5 \times 10^6$ /ml이도록 조정한 혼탁액을 37°C로 가온하고, 그 다음 3-0이소부틸-1-메틸크산틴(0.5 mM)으로 5분동안 예비처리하였다. 혼탁액에 다양한 농도로 희석시킨 시험화합물을 첨가하였다. 10분 후에, 0.1 내지 2.0 μM의 PGD<sub>2</sub>를 첨가함으로써 반

응을 유도하였고, 15분 후에 HCl를 첨가함으로써 반응을 종결시켰다. 초음파 균질화기로 혈소판을 파괴하였다. 원심분리후에, 상청액중의 cAMP를 방사 분석하여 결정하였다. 약제의 PGD 수용체 길항작용을 하기와 같이 측정하였다. PGD<sub>2</sub>를 첨가함으로써 증가하는 cAMP에 대한 억제율을 각각의 농도에 대하여 측정한 다음, 50% 억제하는데 필요한 약제의 농도( $IC_{50}$ )를 계산하였다. 결과를 하기 표에 제시하였다.

| 화합물 번호 | 인간 혈소판 cAMP의 증가 억제율( $IC_{50}$ )( $\mu M$ ) |
|--------|---------------------------------------------|
| 3a-16  | 0.37                                        |
| 1a-12  | 12.11                                       |
| 1a-28  | 0.30                                        |
| 1a-47  | 2.09                                        |
| 2a-2   | 0.77                                        |
| 2a-4   | 0.94                                        |
| 2a-35  | 1.52                                        |
| 2a-75  | 0.71                                        |

### 실험 3 코의 폐색증 모델을 사용한 실험

기니아 피그를 사용하여 코 공동 저항성을 측정하고 코 폐색에 대한 저항성을 측정하는 방법을 하기와 같이 기술하였다.

1% 오발부민(OVA) 용액을 초음파 분무기로 처리하여 에어로졸을 수득하였다. 하틀리(Hartley) 수컷 기니아 피그를 1주일 간격을 두고 10분동안 두번 에어로졸을 흡입시켜 증강시켰다. 증강시키고 7일 후, 기니아 피그를 항원에 노출시켜 반응을 개시시켰다. 그 다음, 펜토바비탈(30mg/kg, 복강내)로 마취시킨 상태에서 기관을 절개하여, 폐 및 코의 공동 측면에서 캐뉼라(cannula)를 기관으로 삽입하였다. 폐의 측면에 삽입된 캐뉼라를, 4mL의 공기를 60 회/분으로 제공하는 인공 호흡기와 연결시켰다. 가라민(2mg/kg, 정맥내)으로 기니아 피그의 자발적인 호흡을 저지시킨 후, 4mL 공기/회의 유속, 70회/분의 빈도로 인공 호흡기가 달린 관의 주동이에 공기를 공급하였고, 통기에 요구되는 대기압을 분지에 꼭 맞는 변환기를 사용하여 측정하였다. 측정치를 코 공동 저항성의 변수로서 사용하였다. 호흡기 및 코 공동 캐뉼라 사이에 3분동안 3% OVA 용액의 에어로졸을 발생시킴으로써 항원에 노출시켰다. 항원에 노출시키기 전에 시험 약제를 10분동안 정맥내 주사하였다. 0 내지 30분 동안 코의 저항성을 연속적으로 측정하였고, 그 효과를 지표로서 30분 동안 AUC를 사용하여 부형제에 대하여 수득한 효과에 대한 억제율로 표시한다(y축 : 코 공동의 저항성 (cm, H<sub>2</sub>O), x축 : 시간 (0 내지 30분)). 결과는 하기와 같다.

| 화합물 번호  | 억제율(%) 1mg/kg (정맥내) | 비고            |
|---------|---------------------|---------------|
| 1a-28   | 44                  |               |
| 1a-98   | 69                  |               |
| 1a-100  | 50                  |               |
| 1a-115  | 66                  |               |
| 1a-116  | 48                  |               |
| 1a-120  | 58                  | 3 mg/kg (정맥내) |
| 1a-2    | 82                  |               |
| 1a-162  | 80                  |               |
| 1a-176  | 60                  |               |
| 1a-267  | 62                  |               |
| 2a-4    | 60                  |               |
| 2a-21   | 52                  |               |
| 2a-28   | 54                  |               |
| 2a-95   | 77                  |               |
| 2a-96   | 77                  | 10 mg/kg (경구) |
| 2a-109  | 73                  |               |
| 2a-110  | 66                  | 10 mg/kg (경구) |
| 22a-194 | 79                  |               |

### 제형예 1 정제의 제조

mg 정제의 성분은 하기와 같다.

|                                                                            |          |
|----------------------------------------------------------------------------|----------|
| 칼슘 (+)-(2)-7-[((1R,2S,3S,4S)-3-멘톨론아미도비사이<br>클로[2.2.1]헵트-2-일]-5-헵테노에이트 이수화물 | 40.0 mg  |
| 하이드록시프로필 셀룰로즈                                                              | 3.6 mg   |
| 마그네슘 스테아레이트                                                                | 0.4 mg   |
| 옥수수전분                                                                      | 18.0 mg  |
| 락토즈                                                                        | 58.0 mg  |
| 총                                                                          | 120.0 mg |

## 제형에 2 과립의 제조

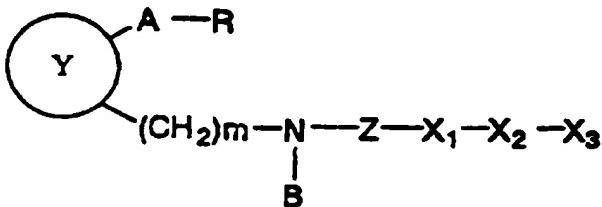
성분은 다음과 같다.

|                                                                            |           |
|----------------------------------------------------------------------------|-----------|
| 칼슘 (+)-(2)-7-[((1R,2S,3S,4S)-3-멘톨론아미도비사이<br>클로[2.2.1]헵트-2-일]-5-헵테노에이트 이수화물 | 100.0 mg  |
| 하이드록시프로필 셀룰로즈                                                              | 30.0 mg   |
| 카멜로즈 칼슘                                                                    | 30.0 mg   |
| 황석                                                                         | 10.0 mg   |
| 플록사머(Poloxamer) 188                                                        | 20.0 mg   |
| 결정질 셀룰로즈                                                                   | 70.0 mg   |
| 옥수수전분                                                                      | 300.0 mg  |
| 락토즈                                                                        | 440.0 mg  |
| 총                                                                          | 1000.0 mg |

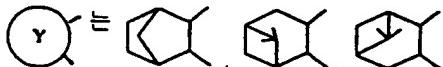
## (57) 청구의 범위

청구항 1. 활성 성분으로서 하기 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물을 포함하는 프로스타글라딘 디2 (PGD<sub>2</sub>)길항제:

화학식 I



상기 식에서,



또는

A는 선택적으로 쇄중에 헤테로 원자 또는 페닐렌을 함유하고, 옥소기를 함유하고/ 함유하거나, 불포화 결합을 갖는 알킬렌이고;

B는 수소, 알킬, 아르알킬 또는 아실이고;

R는 COOR<sub>1</sub>, CH<sub>2</sub>OR<sub>2</sub> 또는 CON(R<sub>3</sub>)R<sub>4</sub>이고;

R<sub>1</sub>은 수소 또는 알킬이고;

R<sub>2</sub>는 수소 또는 알킬이고;

R<sub>3</sub> 및 R<sub>4</sub>는 각각 독립적으로 수소, 알킬, 하이드록시 또는 알킬설폰일이고;

X<sub>1</sub>은 단일 결합, 페닐렌, 나프틸렌, 티오펜디일, 인돌디일 또는 옥사졸디일이고;

$X_2$ 는 단일 결합,  $-N=N-$ ,  $-N=CH-$ ,  $-CH=N-$ ,  $-CH=N-N$ ,  $-CH=N-O-$ ,  $-C=NNHCSNH-$ ,  $-C=NNHCONH-$ ,  $-CH=CH-$ ,  $CH(OH)-$ ,  $-C(C1)=C(C1)-$ ,  $-(CH_2)_n-$ , 에틴일렌,  $-N(R_5)-$ ,  $-N(R_{51})CO-$ ,  $-N(R_{52})SO_2-$ ,  $-N(R_{53})CON(R_{54})-$ ,  $-CON(R_{55})-$ ,  $-SO_2N(R_{56})-$ ,  $-O-$ ,  $-S-$ ,  $-SO-$ ,  $-SO_2-$ ,  $-CO-$ , 옥사디아졸디일, 티아디아졸디일 또는 테트라졸디일이고;

$X_3$ 은 알킬, 알켄일, 알킨일, 아릴, 아르알킬, 헤테로사이클릭 기, 사이클로알킬, 사이클로알켄일, 티아졸린일리텐메틸, 티아졸리딘일리텐메틸,  $-CH=NR_6$  또는  $-N=C(R_7)R_6$ 이고;

$R_5$ ,  $R_{51}$ ,  $R_{52}$ ,  $R_{53}$ ,  $R_{54}$ ,  $R_{55}$  및  $R_{56}$ 은 각각 수소 또는 알킬이고;

$R_6$ 은 수소, 알킬, 하이드록시, 알콕시, 카바모일옥시, 티오카바모일옥시, 우레이도 또는 티오우레이도이고;

$R_7$  및  $R_8$ 은 각각 독립적으로 알킬, 알콕시 또는 아릴이고;

$n$ 은 1 또는 2이고;

$Z$ 는  $-SO_2-$  또는  $-CO-$ 이고;

$m$ 은 0 또는 1이며;

이때, 사이클릭 치환체는 니트로, 알콕시, 살파모일, 치환된- 또는 비치환된-아미노, 아실, 아실옥시, 하이드록시, 할로겐, 알킬, 알킨일, 카복시, 알콕시카보닐, 아르알콜시카보닐, 아릴옥시카보닐, 메실옥시, 시아노, 알켄일옥시, 하이드록시알킬, 트리플루오로메틸, 알킬티오,  $-N=PPh_3$ , 옥소, 티옥소, 하이드록시아미노, 알콕시아미노, 페닐 및 알킬렌디옥시로 구성된 그룹중에서 선택된 1 내지 3개의 치환체를 가질 수도 있다.

청구항 2. 제 1 항에 있어서,

활성 성분이,



$m$ 이 0이고;

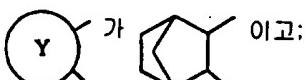
$Z$ 가  $SO_2$ 이고;

$X_1$  및  $X_2$ 가 둘다 단일 결합이고;

$X_3$ 이 알킬, 페닐, 나프틸, 스타일릴, 퀴놀릴 또는 티엔일인(이들 치환체중의 사이클릭 치환체는 선택적으로 니트로, 알콕시, 치환된- 또는 비치환된-아미노, 할로겐, 알킬 및 하이드록시알킬에서 선택된 1 내지 3개의 치환체를 가짐) 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물인 PGD<sub>2</sub> 길항제.

청구항 3. 제 1 항에 있어서,

활성 성분이,



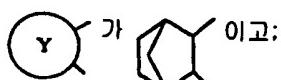
$m$ 이 1이고;

$X_1$  및  $X_2$ 가 둘다 단일 결합이고;

$X_3$ 이 선택적으로 할로겐으로 치환된 페닐인 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물인 PGD<sub>2</sub> 길항제.

청구항 4. 제 1 항에 있어서,

활성 성분이,



$m$ 이 1이고;

$X_1$ 이 페닐이고;

$X_2$ 가  $-CH_2-$  또는  $-N=N-$ 이고;

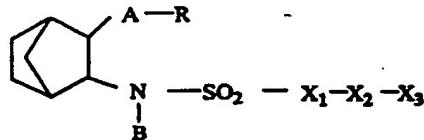
$X_3$ 이 페닐인 화학식 I의 화합물 또는 그의 염 또는 이들의 수화물인 PGD<sub>2</sub> 길항제.

청구항 5. 제 1 항에 있어서,

코의 폐색증을 치료하기 위한 약제인 PGD<sub>2</sub> 길항제.

청구항 6. 하기 화학식 Ia의 화합물 또는 그의 염 또는 이들의 수화물:

화학식 Ia



상기 식에서,

A, B, R,  $X_1$ ,  $X_2$  및  $X_3$ 은 화학식 I에 대하여 정의한 바와 같고.

단. (1)  $X_1$  및  $X_2$ 가 단일 결합이고,  $X_3$ 이 치환된- 또는 비치환된-페닐 또는 나프틸인 경우와 (2) A가 5-헵텐일렌이고, R이  $\text{COOR}_1$ (이때,  $R_1$ 은 수소 또는 에틸임)이고,  $X_1$ 이 1,4-페닐렌이고,  $X_2$ 가 단일 결합이고,  $X_3$ 이 페닐인 경우를 제외한다.

청구항 7. 제 6 항에 있어서.

$X_1$  및  $X_2$ 가 단일 결합이고  $X_3$ 이 이속사졸일, 티아디아졸일, 이소티아졸일, 모풀일, 인돌일, 벤조푸릴, 디벤조푸릴, 디벤조디옥신일, 벤조티엔일, 디벤조티엔일, 카바졸일, 크산텐일, 페난트리딘일, 디벤즈옥시펜일, 디벤조티에핀일, 시놀일, 크로멘일, 벤제이다졸일 또는 디하이드로벤조티에핀일이고, A, B 및 R이 제 1 항에서 정의한 바와 같은 화합물 또는 그의 염 또는 이들의 수화물.

청구항 8. 제 6 항에 있어서.

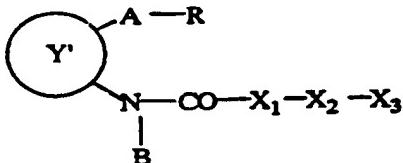
$X_1$ 이 단일 결합이고,  $X_2$ 가 페닐렌이고,  $X_3$ 이 알켄일, 알킬일,  $-\text{CH}=\text{NR}_6$  또는  $-\text{N}=\text{C}(\text{R}_7)\text{R}_8$ 이고, A, B, R,  $R_6$ ,  $R_7$  및  $R_8$ 이 제 1 항에서 정의한 바와 같은 화합물 또는 그의 염 또는 이들의 수화물.

청구항 9. 제 6 항에 있어서.

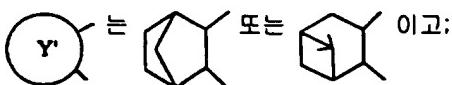
R이  $\text{COOR}_1$ 이고,  $X_1$ 이 페닐렌 또는 티오펜디일이고,  $X_2$ 가 단일 결합,  $-\text{N}=\text{N}-$ ,  $-\text{CH}=\text{CH}-$ ,  $-\text{CONH}-$ ,  $-\text{NHCO}-$  또는 에틴일렌이고,  $X_3$ 이 페닐, 티아졸린일리덴메틸, 티아졸리딘일리덴메틸 또는 티엔일이고, A, B,  $R_1$ ,  $R_6$ ,  $R_7$  및  $R_8$ 이 제 1 항에서 정의한 바와 같은 화합물 또는 그의 염 또는 이들의 수화물.

청구항 10. 하기 화학식 Ib의 화합물 또는 그의 염 또는 이들의 수화물:

화학식 Ib



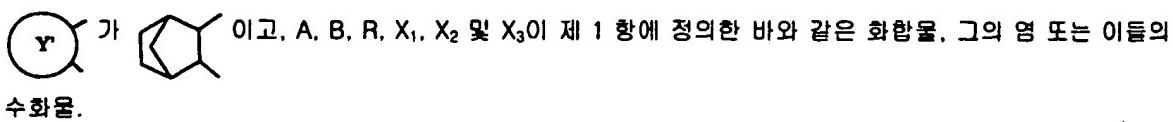
상기 식에서,



A, B, R,  $X_1$ ,  $X_2$  및  $X_3$ 은 화학식 I에 대하여 정의한 바와 같고.

단.  $X_1$  및  $X_2$ 가 단일 결합이고,  $X_3$ 이 페닐인 경우와  $X_1$ 이 단일 결합이고,  $X_2$ 가  $-\text{O}-$ 이고,  $X_3$ 이 벤질인 경우를 제외한다.

청구항 11. 제 10 항에 있어서.



청구항 12. 제 11 항에 있어서.

R이  $\text{COOR}_1$ (이때,  $R_1$ 은 제 1 항에서 정의한 바와 같음)인 화합물, 그의 염 또는 이들의 수화물.

청구항 13. 제 11 항에 있어서.

$X_1$ 이 페닐렌 또는 티오펜디일이고,  $X_2$ 가 단일 결합,  $-\text{N}=\text{N}-$ ,  $-\text{CH}=\text{CH}-$ , 에틴일렌,  $-\text{O}-$ ,  $-\text{S}-$ ,  $-\text{CO}-$ ,  $-\text{CON}(\text{R}_{55})-$ (이때,  $\text{R}_{55}$ 는 제 1 항에서 정의한 바와 같음),  $-\text{N}(\text{R}_{51})\text{CO}-$ (이때,  $\text{R}_{51}$ 은 제 1 항에서 정의한 바와 같음)

옴)이고,  $X_3$ 이 페닐 또는 티엔일인 화합물, 그의 염 또는 이들의 수화물.

청구항 14. 제 10 항에 있어서.



들의 수화물.

청구항 15. 제 14 항에 있어서.

B가 수소이고,  $X_1$  및  $X_2$ 가 둘다 단일 결합이고,  $X_3$ 이 티엔일, 티아졸일, 티아디아졸일, 이소티아졸일, 피롤일, 파리딜, 벤조푸릴, 벤즈이미다졸일, 벤조티엔일, 디벤조푸릴, 디벤조티엔일, 퀴놀일 또는 인돌일인 화합물, 그의 염 또는 이들의 수화물.

청구항 16. 제 15 항에 있어서.

$X_1$ 이 페닐렌, 티오펜디일, 인돌디일 또는 옥사졸디일이고,  $X_2$ 가 단일 결합,  $-N=N-$ ,  $-CH=CH-$ , 에틴일렌,  $-S-$  또는  $-O-$ 이고,  $X_3$ 이 아릴 또는 헤테로사이클릭 기인 화합물, 그의 염 또는 이들의 수화물.

